

DT Small Mixers Installation, Operation, Maintenance Manual

Equipment Reference:
20DTA, 20DTL Style Mixer
30DTA, 30DTL Style Mixer
40DTA, 40DTL Style Mixer

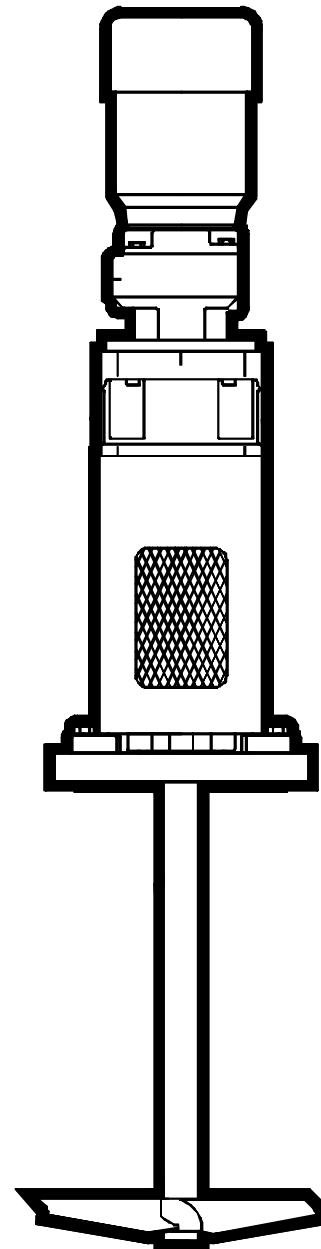


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INITIAL INSPECTION

Step 1: Inspect crates. Upon receipt, inspect all crates and equipment for shipping damage. Report shipping damage to your local Chemineer office or to the factory in Dayton, Ohio. A claim should be filed immediately with the carrier involved.

Step 2: Uncrate. Check the contents. Do not uncrate the unit until you have read the *Mounting & Installation* section of this manual and looked at the assembly drawing shipped with the unit. Be careful in uncrating and handling. Do not discard the crating without making sure that all mixer parts have been removed. Correct assembly of this unit requires referring to both the unit assembly drawing and this manual.

Step 3: Questions? Call Chemineer. If the shipment is not complete or you do not understand what you have received, please contact *your local Chemineer office* immediately.

CHEMINEER ASSISTANCE

Chemineer maintains a fully staffed Parts and Field Service Department ready to help you with any service requirement. Simply contact your local Chemineer office, or contact Parts/Field Service at the Chemineer Factory in Dayton, Ohio:

Chemineer, Inc.
P.O. Box 1123
Dayton, Ohio 45401
Phone: (937) 454-3200
FAX: (937) 454-3375

Services available are as follows:

Installation and maintenance training seminars,
Installation and start-up supervision,
Preventative maintenance planning,
Parts order service,
Special instructions.

STORAGE

Do not remove any protective packaging, coatings (generally applied to the motor or gearmotor output shafts), or any protective coverings that may be applied to the wetted parts until the mixer is to be put into service. If the equipment is to be stored, *do not stack crates*. Store in a clean dry indoor location that is free from wide variations in temperature. The storage area should be free from vibration and excessive heat.

Inspect for external rust at six-month intervals. Apply rust preventative as required. If the unit has been in storage for more than six months or subjected to adverse moisture conditions, the motor windings may have to be dried prior to operation.

CAUTION! Coated/rubber covered agitator parts require special handling to avoid damage to coatings/rubber coverings. Do not use chains or hooks on coated/covered surfaces. Special care is required to prevent damage to edges and outside corners. Contact Chemineer Field Service for instructions.

Short-Term Indoor Storage

Mixers should be stored indoors in areas with no vibration and relatively constant temperatures and humidity. The factory storage preparations should be acceptable for up to six months storage.

Rotate the drive coupling 10 to 15 revolutions at least once per month to reduce the possibility of brinelling of the bearings and to redistribute bearing grease.

VESSEL EVALUATION

Refer to the mixer assembly drawing for the required support structure design loads.

In designing the structure to accommodate bending moment, the structure should be sufficiently rigid so that the mixer extension shaft will not move more than 1/64 inch (.4mm) per foot of length due to deflection of the mounting system.


These units are supplied with a standard flange designed to mount on an ANSI or DIN nozzle or pad located on the vessel top head. Refer to the mixer assembly drawing for agitator mounting flange size and type. Special flanges, including ferrule type, are also available.

The following methodology will help determine if the designated vessel top head is sufficiently rigid to properly support a mixer or if reinforcement through gusseting is required.

1. Evaluate the designated vessel top head. Recommended head thicknesses are listed for un Gusseted nozzles (*Table 1*) and un Gusseted pads (*Table 2*). If the designated vessel head thickness conforms to the given dimension, refer to *page 7* for ***Sealed Tank Mixer Installation***. No further vessel head thickness evaluation is required.

**TABLE 1: RECOMMENDED MINIMUM HEAD THICKNESSES, “t”, inches (mm)
FOR UNGUSSETED NOZZLE MOUNTING**

CASE SIZE	TANK DIAMETER, “T” FT (M)									
	2 (.61)	2.5 (0.76)	3 (0.91)	4 (1.22)	5 (1.52)	6 (1.83)	7 (2.13)	8 (2.44)	9 (2.74)	10 (3.05)
20DTA	.250	.250	.375	.375	.375	.500	.500			
20DTL	(6.4)	(6.4)	(9.5)	(9.5)	(9.5)	(12.7)	(12.7)			
30DTA	.250	.250	.375	.375	.375	.500	.500			
30DTL	(6.4)	(6.4)	(9.5)	(9.5)	(9.5)	(12.7)	(12.7)			
40DTA	.250	.375	.375	.500	.500	.500	.625	.625	.625	.625
40DTL	(6.4)	(9.5)	(9.5)	(12.7)	(12.7)	(12.7)	(15.9)	(15.9)	(15.9)	(15.9)

 Cells shaded in gray are “not recommended”.

**TABLE 2: RECOMMENDED MINIMUM HEAD THICKNESS, “t”, inches (mm)
FOR PAD MOUNTING**

CASE SIZE	TANK DIAMETER, “T” FT (M)									
	2 (.61)	2.5 (0.76)	3 (0.91)	4 (1.22)	5 (1.52)	6 (1.83)	7 (2.13)	8 (2.44)	9 (2.74)	10 (3.05)
20DTA	.375	.375	.375	.500	.500	.625	.625			
20DTL	(9.5)	(9.5)	(9.5)	(12.7)	(12.7)	(15.9)	(15.9)			
30DTA	.375	.375	.375	.500	.500	.625	.625			
30DTL	(9.5)	(9.5)	(9.5)	(12.7)	(12.7)	(15.9)	(15.9)			
40DTA	.188	.188	.188	.188	.250	.375	.375	.375	.375	.500
40DTL	(4.8)	(4.8)	(4.8)	(4.8)	(6.4)	(9.5)	(9.5)	(9.5)	(9.5)	(12.7)

 Cells shaded in gray are “not recommended”.

VESSEL EVALUATION

- If the designated vessel top head **does not** meet *Table 1 or Table 2* criteria, reinforcement support may be added to provide the equivalent rigidity of a thicker head, providing that the existing head thickness meets the minimum thicknesses as noted in *Table 3, below*, for nozzles or pads. Reference *Figure 1, page 5*.

If the vessel head still does not meet the minimum thicknesses listed below, consult Chemineer Field Service for assistance.

TABLE 3: RECOMMENDED MINIMUM HEAD THICKNESSES, “t”, inches (mm) FOR REINFORCED NOZZLE OR PAD MOUNTING

CASE SIZE	TANK DIAMETER, “T” FT (M)									
	2 (.61)	2.5 (0.76)	3 (0.91)	4 (1.22)	5 (1.52)	6 (1.83)	7 (2.13)	8 (2.44)	9 (2.74)	10 (3.05)
20DTA	.188	.188	.188	.250	.250	.250	.250			
20DTL	(4.8)	(4.8)	(4.8)	(6.4)	(6.4)	(6.4)	(6.4)			
30DTA	.188	.188	.188	.250	.250	.250	.250			
30DTL	(4.8)	(4.8)	(4.8)	(6.4)	(6.4)	(6.4)	(6.4)			
40DTA	.125	.125	.125	.125	.125	.188	.188	.188	.188	.188
40DTL	(3.2)	(3.2)	(3.2)	(3.2)	(3.2)	(4.8)	(4.8)	(4.8)	(4.8)	(4.8)

 Cells shaded in gray are “not recommended”.

- If reinforcement is applicable, refer to *Tables 4 and 5, below and Figure 2, page 6* for proper reinforcement dimensions.

TABLE 4: MOUNTING NOZZLE REINFORCEMENT DIMENSIONS, inches (mm)

A ANSI – DIN	B NOZZLE HEIGHT MINIMUM	C GUSSET DIMENSION	D BACKUP PLATE RADIUS
6 (150)	4 (102)	6.5 (165)	12 (305)

TABLE 5: MOUNTING PAD REINFORCEMENT DIMENSIONS, inches (mm)

A ANSI – DIN	D BACKUP PLATE RADIUS
6 (150)	12 (305)

VESSEL EVALUATION

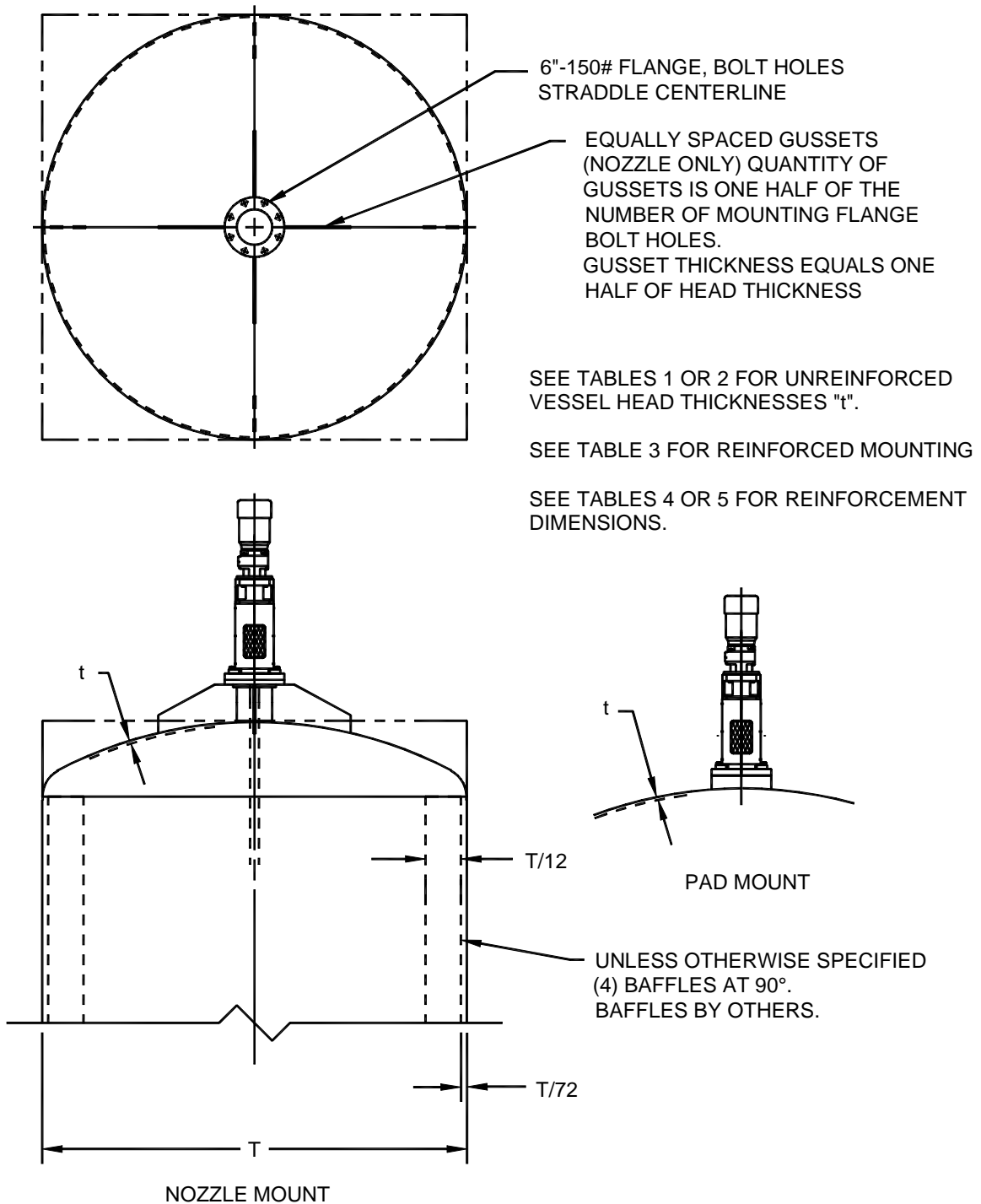


Figure 1: Models DTA, DTL Installation

VESSEL EVALUATION

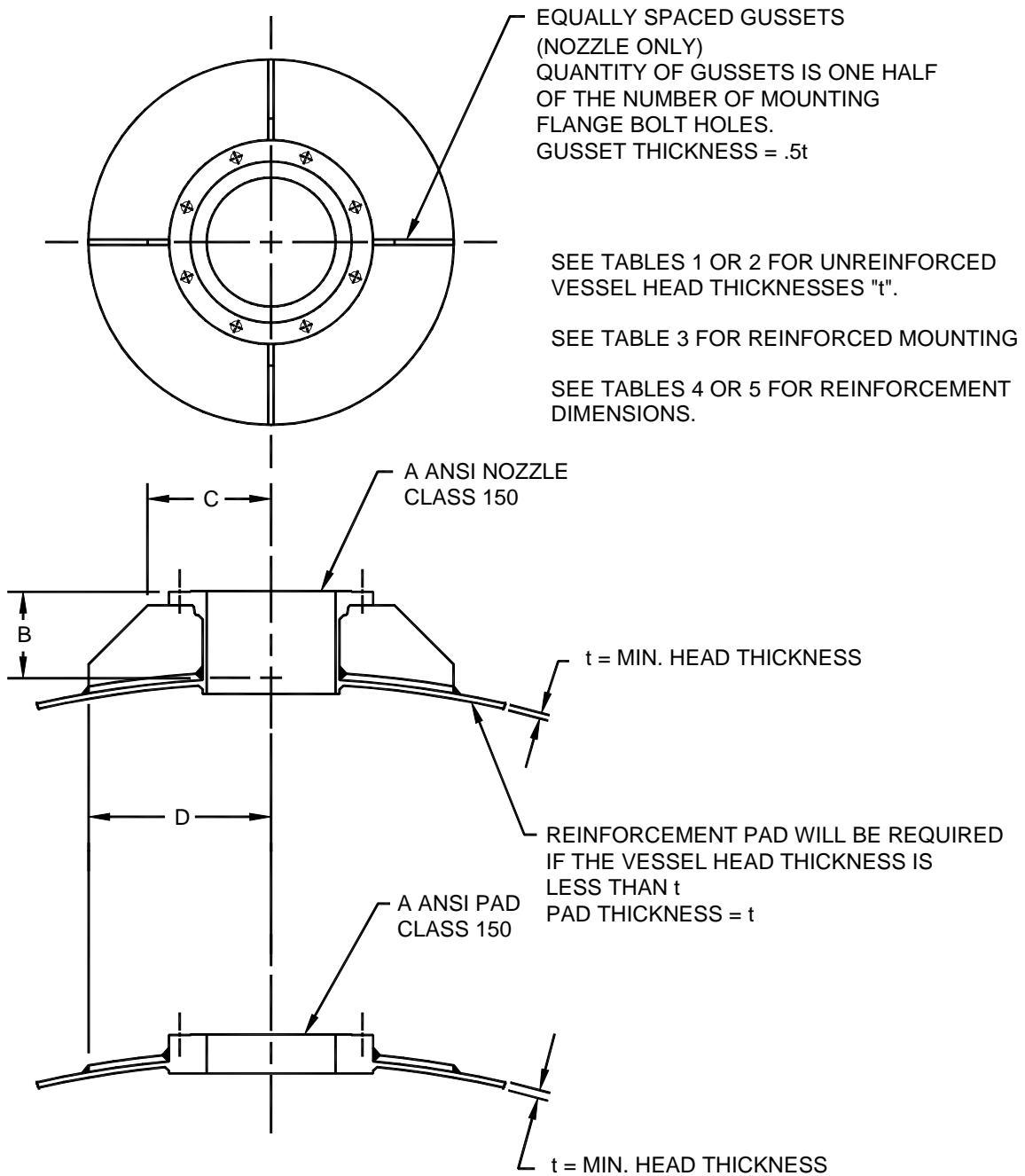


Figure 2: Models DTA, DTL Mounting, Nozzle/Pad

SEALED TANK MIXER INSTALLATION

Correct unit installation requires both the unit assembly drawing and this manual.

The models 20DTA or 20DTL are gear reduced, stuffing box (20DTA) or v-ring (20DTL) sealed designs for closed tank applications. The drive unit is typically shipped with the gearmotor (integral motor/gear reducer) [105] mounted to the cast aluminum housing [201-06]. A plated chuck drive shaft [218] coupling with bearing support extends from the housing for extension shaft attachment. Also in the main unit box will be a separate carton for the seal assembly [1300 or 1800], handhole cover [1100], mounting flange [1251], impellers [500] and all other required accessories. Shafting [400] is shipped separately.

The models 30DTA or 30DTL are direct drive, stuffing box (30DTA) or v-ring (30DTL) sealed designs for closed tank applications. The drive unit is typically shipped with the motor [100] mounted to the cast aluminum housing [201-04]. A plated chuck drive shaft [218] coupling with bearing support extends from the housing for extension shaft attachment. Also in the main unit box will be a separate carton for the seal assembly [1300 or 1800], handhole cover [1100], mounting flange [1251], impellers [500] and all other required accessories. Shafting [400] is shipped separately.

The models 40DTA or 40DTL are gear reduced, heavy duty, stuffing box (40DTA) or v-ring (40DTL) sealed designs for closed tank applications. The drive unit is typically shipped with the gearmotor (integral motor/gear reducer) [105] mounted to the cast aluminum housing [201-04]. A plated flanged drive shaft [217] coupling with bearing support extends from the housing for flanged removable shaft coupling [300] attachment. Also in the main unit box will be a separate carton for the seal assembly [1300 or 1800], handhole cover [1100], removable extension shaft coupling [300], mounting flange [1251], impellers [500] and all other required accessories. Shafting [400] is shipped separately.

Be certain to locate all contents before discarding packaging materials.

1. Remove all shipping constraints. A nylon strap, or similar, should be secured around the mixer housing [201-04] to lift and move the mixer. Please note the approximate net weight of the unit as shown on the assembly drawing and use caution when moving or lifting these items. *At no point during installation or maintenance of the mixer, should the extension shaft ever be used as a lifting point!*

WARNING: *DO NOT connect the mixer to the power source until the unit is fully assembled and properly positioned in the vessel.*

2. Install the mounting flange [1251], onto the vessel nozzle using a customer supplied gasket and fastener set.

SEALED TANK MIXER INSTALLATION

3. Lift the mixer shaft [400] and lower it into the vessel. All welded shaft assemblies may require an alternate vessel opening to lower the shaft assembly through, prior to raising it through the mixer mounting flange.
4. Lift the shaft up through the mixer mounting flange from the inside of the vessel and block it in place such that the shaft end is approximately 6" above the mounting flange top surface.
5. **For DTA units:** Place o-ring [1252] into the groove in the mounting flange [1251]. Install packing housing [1307] with bolts, lockwashers, and flatwashers [1309, 1310, 1311]. *Do not tighten packing housing bolts at this time.* Install the packing rings [1308] being careful to stagger the packing split. Seat each packing ring as it is installed. Install the two threaded studs [1301] at 180° from each other.

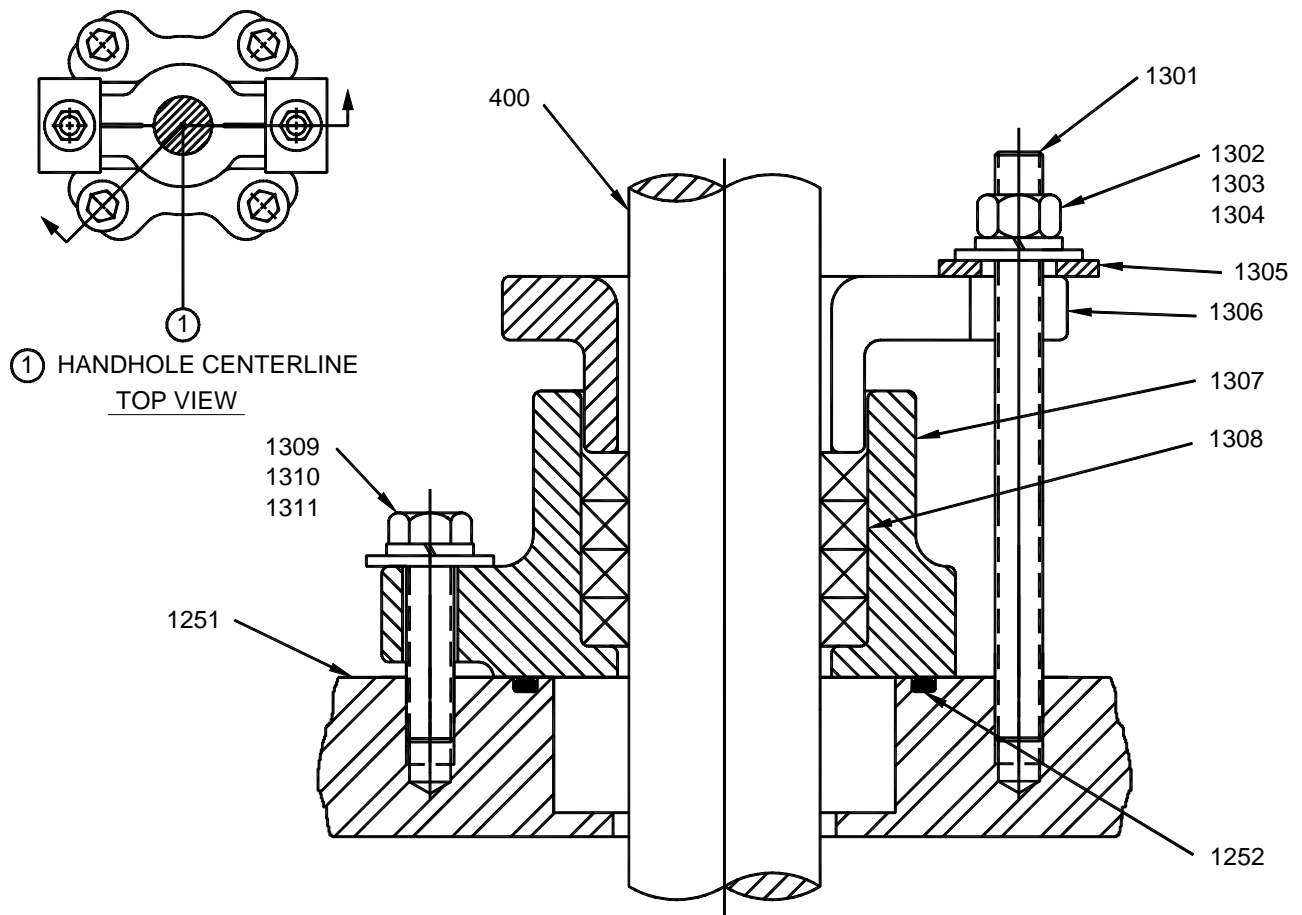


Figure 3: Stuffing Box Installation

SEALED TANK MIXER INSTALLATION

For DTL units: Place o-ring [1252] into the groove in the mounting flange [1251]. Install the seal plate [1802] with bolts and lockwashers [1803, 1804]. Install the v-ring [1801] over the shaft end and onto the seal plate. *Do not tighten seal plate mounting bolts at this time.*

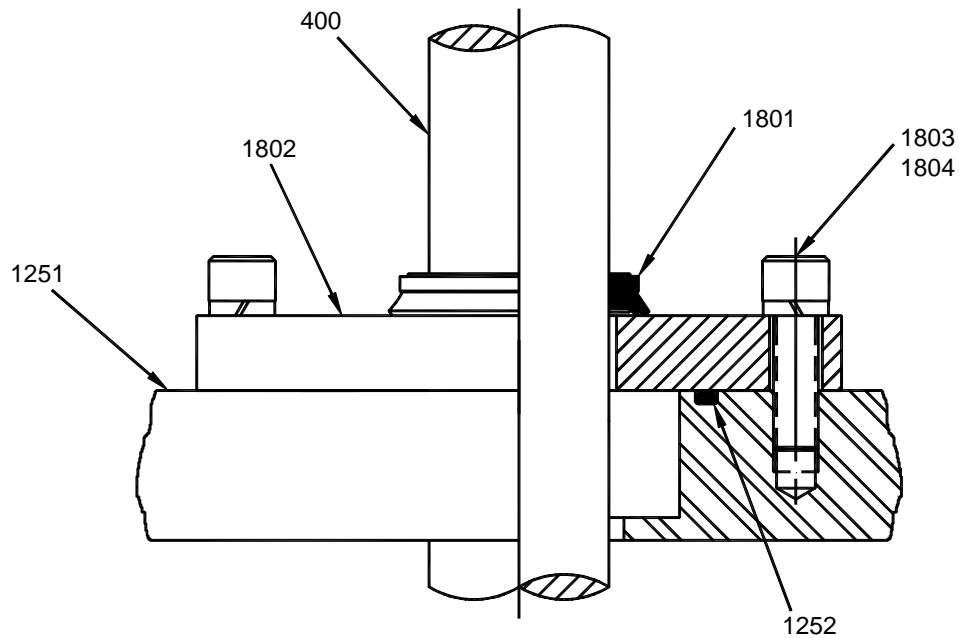


Figure 4: V-Ring Seal Installation

SEALED TANK MIXER INSTALLATION

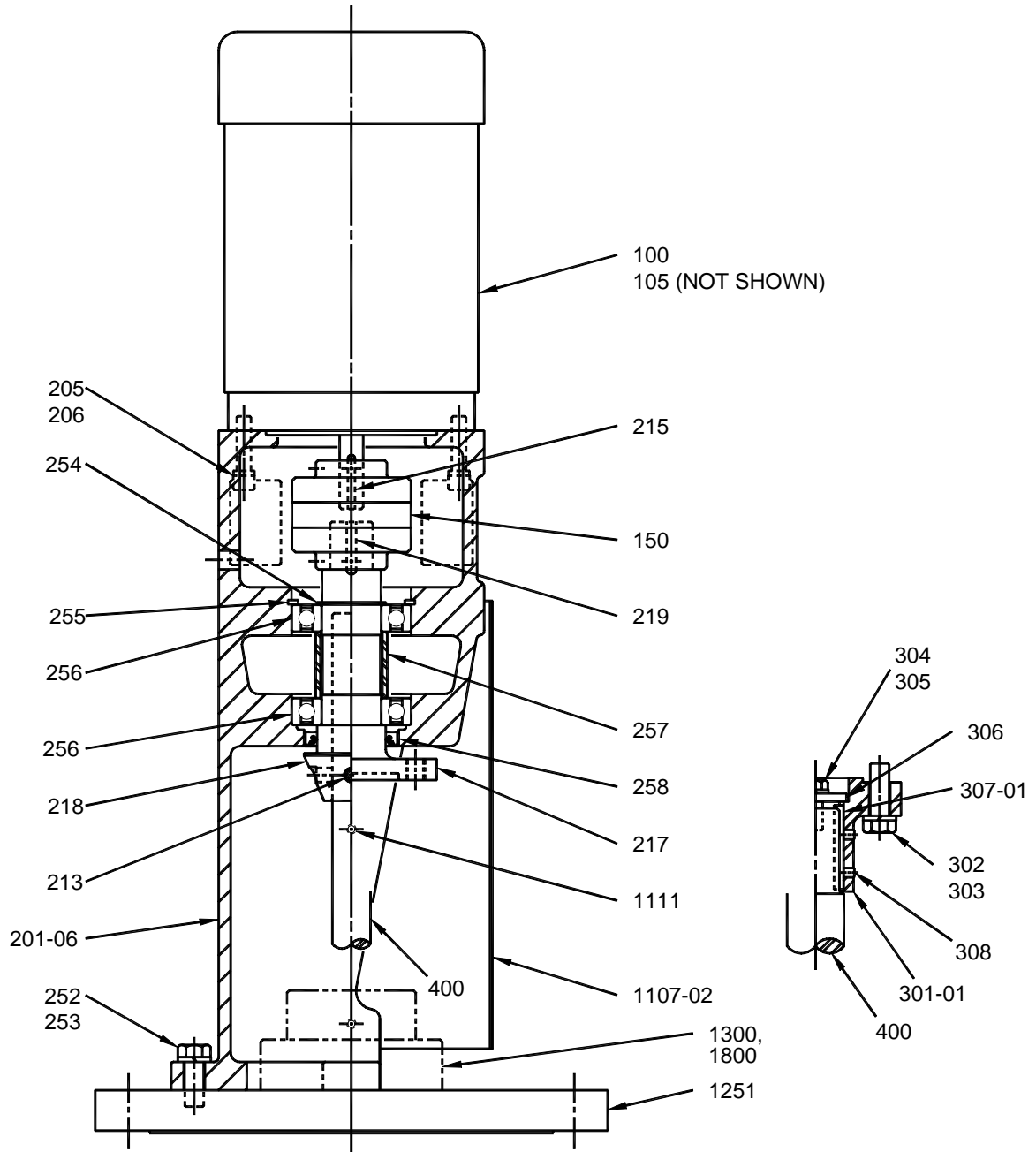


Figure 5: Models DTA, DTL Drive Assembly

SEALED TANK MIXER INSTALLATION

6. For units with 1" diameter shafting and chuck drive shaft coupling:
- a. Lower the drive motor/housing assembly onto the mounting flange **[1251]**. Remove the shaft blocking. Raise the extension shaft **[400]** and insert it into the drive chuck coupling **[218]** of the drive housing assembly **[200]** until the shaft bottoms out, approximately 5" (127mm). Orient the shaft to allow the chuck coupling setscrews **[213]** (two at 90°) to engage the "flats" on the extension shaft. Tighten chuck setscrews **[213]** with a 3/16" hex key wrench.
 - b. Attach the housing to the mounting flange with bolts and lockwashers **[252, 253]**. Torque bolts to the value shown in *Table 7, page 20*.

For units with 1-1/2" diameter shafting and flanged drive shaft coupling:

- a. Clean the extension shaft **[400]** turndown diameter and the removable shaft coupling **[301-02]**. Make sure both surfaces are completely dry and free from any burrs or nicks. Install the shaft key **[307-02]** into the extension shaft keyway, making sure it is fully bottomed into the keyway. Install the coupling over the shaft end. Install the shaft end washer, bolt, lockwasher, and flatwasher **[304, 305, 306]** and torque to the value shown in *Table 7, page 20*. Engage the two coupling setscrews **[308]** onto the shaft key **[307-02]**.
- b. Lower the drive motor/housing assembly onto the mounting flange **[1251]**. Remove the shaft blocking and lift the extension shaft enough to allow the installation of the coupling bolts and lockwashers **[302, 303]**. Install two coupling bolts and lockwashers at 180°. Tighten the bolts to engage the tenon and pull the removable coupling **[301]** and flanged drive shaft coupling **[217]** faces together. Install and tighten the remaining coupling bolts and lockwashers **[302, 303]**. Attach the housing to the mounting flange with bolts and lockwashers **[252, 253]**. Torque bolts to the value shown in *Table 7*.

SEALED TANK MIXER INSTALLATION

7. **For DTA units:** Install the split packing gland [1306] over the threaded studs [1301] with gland clamps [1305], hex adjusting nuts, lockwashers, and flatwashers [1302, 1303, 1304]. Refer to *Figure 3, page 8*. The split packing gland must be square with the packing housing. Tighten packing housing bolts [1309]. Torque to the value shown in *Table 7, page 20*.

Tighten the hex adjusting nuts [1302]. Let packing set for five to ten minutes so that it can cold flow and adjust to the gland pressure. Loosen the hex adjusting nuts, then finger tighten. After starting the unit, the packing will require adjusting. Refer to ***Operation – Shaft Seals, page 26***.

For DTL units: Center the seal plate on the shaft. Torque bolts to the value shown in *Table 7, page 20*. Refer to *Figure 4, page 9*. Slide the v-ring [1801] down the shaft to contact the seal plate [1802].

8. Install the handhole cover [1107-02] onto the housing with bolts [1111].
9. For single impeller assemblies, install the impeller with the lower hub face even with the shaft end. Impeller orientation should allow the driving edge of the impeller to pump toward the bottom of the mixing vessel. Tighten the impeller setscrews (typically quantity two).

For dual impeller assemblies, space the upper impeller at a recommended minimum of two impeller diameters and maximum of three impeller diameters above the lower impeller. The lower impeller should be a minimum of one impeller diameter below the liquid surface at all times during mixer operation.

SEALED TANK MIXER INSTALLATION OPTIONAL ANGLE MOUNTED DRIVE

Model DTA and DTL mixers may be angle mounted. See *Figure 7, page 14* for mixer nozzle location. See *Figure 1, page 5* for structural requirements.

The drive unit may be angle mounted in any orientation. Unit will attach to vessel nozzle using customer supplied fastener set.

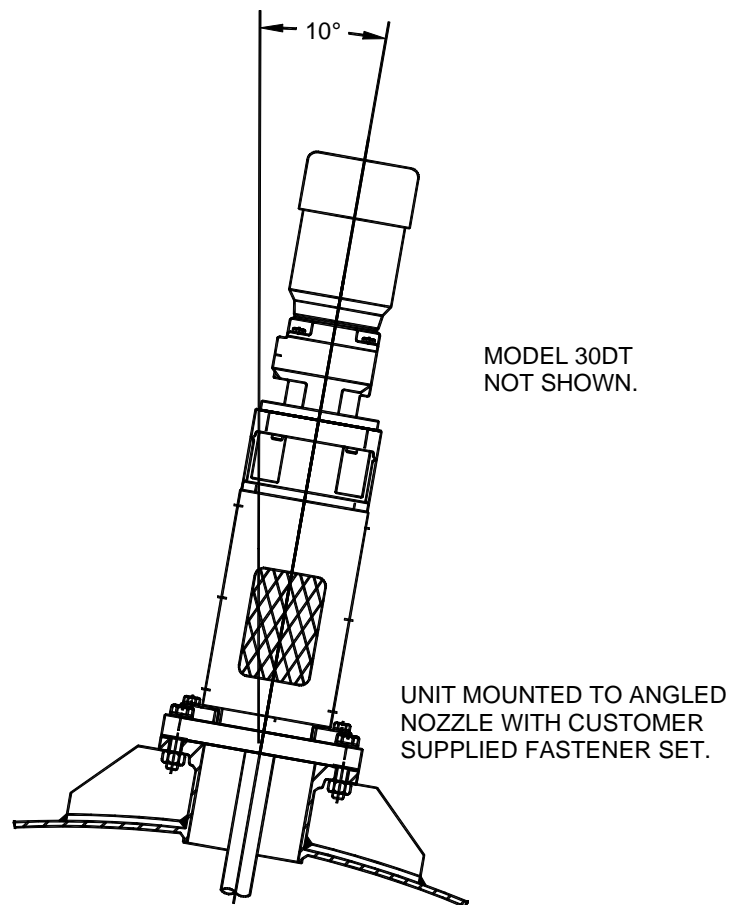
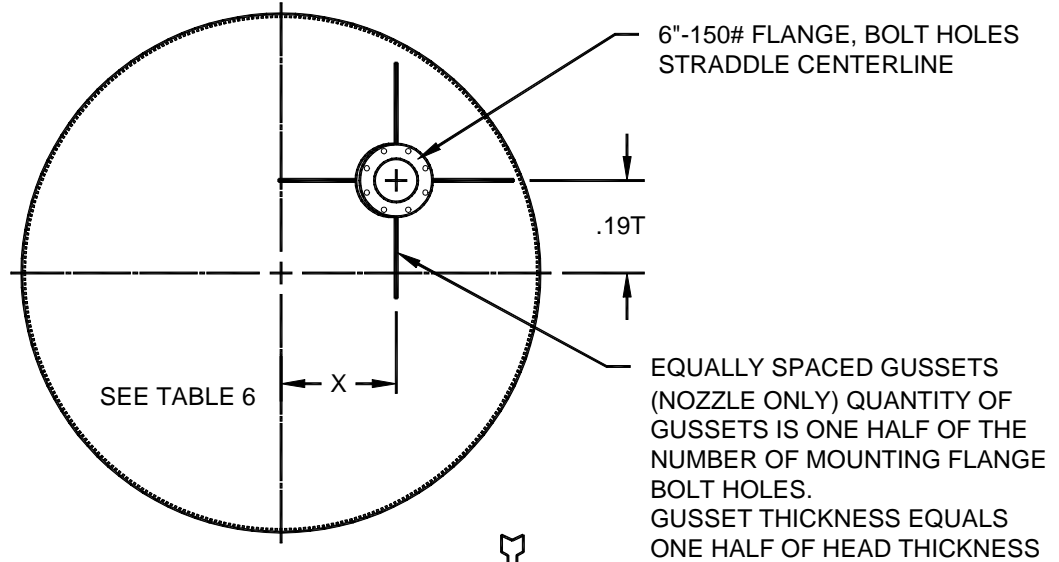


Figure 6: Angle Mounted Drive

**SEALED TANK MIXER INSTALLATION
OPTIONAL ANGLE MOUNTED DRIVE**



SEE TABLES 1 OR 2 FOR UNREINFORCED VESSEL HEAD THICKNESSES "t".

SEE TABLE 3 FOR REINFORCED MOUNTING

SEE TABLES 4 OR 5 FOR REINFORCEMENT DIMENSIONS.

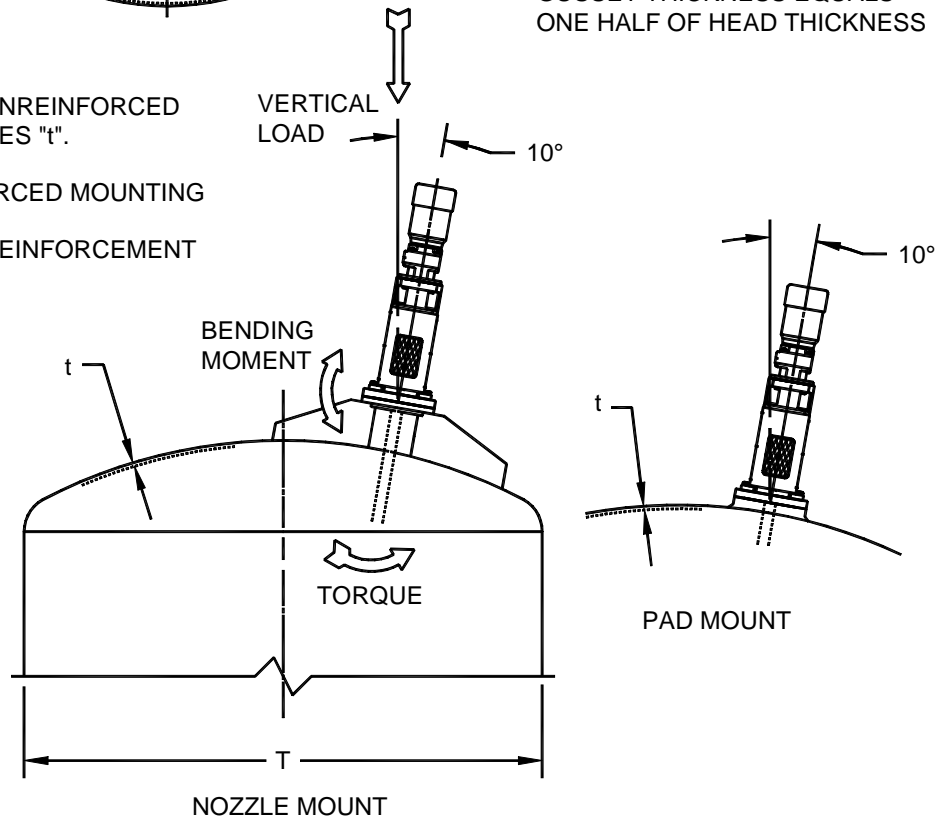


Figure 7: Angle Mount Installation

**SEALED TANK MIXER INSTALLATION
OPTIONAL ANGLE MOUNTED DRIVE****TABLE 6: OFF-CENTER POSITIONING**

SHAFT EXTENSION RANGE IN (MM)	“X” DIMENSION IN (MM)	MINIMUM TANK DIAMETER “T” IN (MM)
20” – 37” (508 – 940)	5” (127)	18” (457)
38” – 53” (965 – 1346)	7.5” (191)	22” (559)
54” – 76” (1372 – 1930)	10.75” (273)	32” (813)
77” – 110” (1956 – 2794)	15.5” (394)	46” (1168)
111” – 135” (2819 – 3429)	21.25” (540)	64” (1626)

MIXER INSTALLATION ELECTRIC MOTORS, GEARMOTORS

1. Check the nameplate data on the motor/gearmotor to assure that the available power supply agrees with the motor requirements. Protective devices should be of the proper size and rating to safely carry the load and interrupt the circuit on overloads.
2. If the motor/gearmotor has been stored in a damp location, the windings may require drying.

NOTE: Do not obstruct the normal flow of ventilating air through or over the motor/gearmotor.

3. Many of the motors supplied with this product are dual voltage. The motor cord supplied with a single phase motor is applicable for use on 125VAC systems only. Customer is responsible for supplying all necessary motor connections and for properly wiring the motors. Refer to wiring diagrams *Figures 8 and 9, pages 17 and 18*, for gearmotor connections and *Figure 10, page 19* for normal motor connections. Consult *Chemineer Field Service* if there are any questions pertaining to the installation or operation of the motor or mixer unit.
4. Connect the motor/gearmotor in accordance with the National Electric Code and local requirements, but do not make the connections permanent until the motor/gearmotor rotation has been checked. Jog the motor/gearmotor to check for correct rotation prior to securing wiring. Refer to unit assembly drawing for unit rotation direction. If any additional motor/gearmotor auxiliary devices such as space heaters or temperature sensors are used, connect them in proper circuits and insulate them from motor/gearmotor power cables.

AIR MOTORS

1. Air motors are designed to be driven by compressed air. Under no circumstances should they be driven with any other type of gas, fluids, particles, solids, or any substance mixed with air.
2. The muffler is shipped uninstalled on the air motor. Always install a moisture trap and filter in the air line ahead of the motor.
3. "Reversible" type air motors will work equally in both directions. A 4-way valve may be connected to both air ports to allow reversible operation. For efficiency of output and control of speed, use air lines of the same size or the next larger pipe size than the intake port of the motor.

*Lubrication of the air motor is required. Refer to **Lubrication** section of this manual for more information.*

MIXER INSTALLATION

TYPE EAR (CAPACITOR START & RUN)

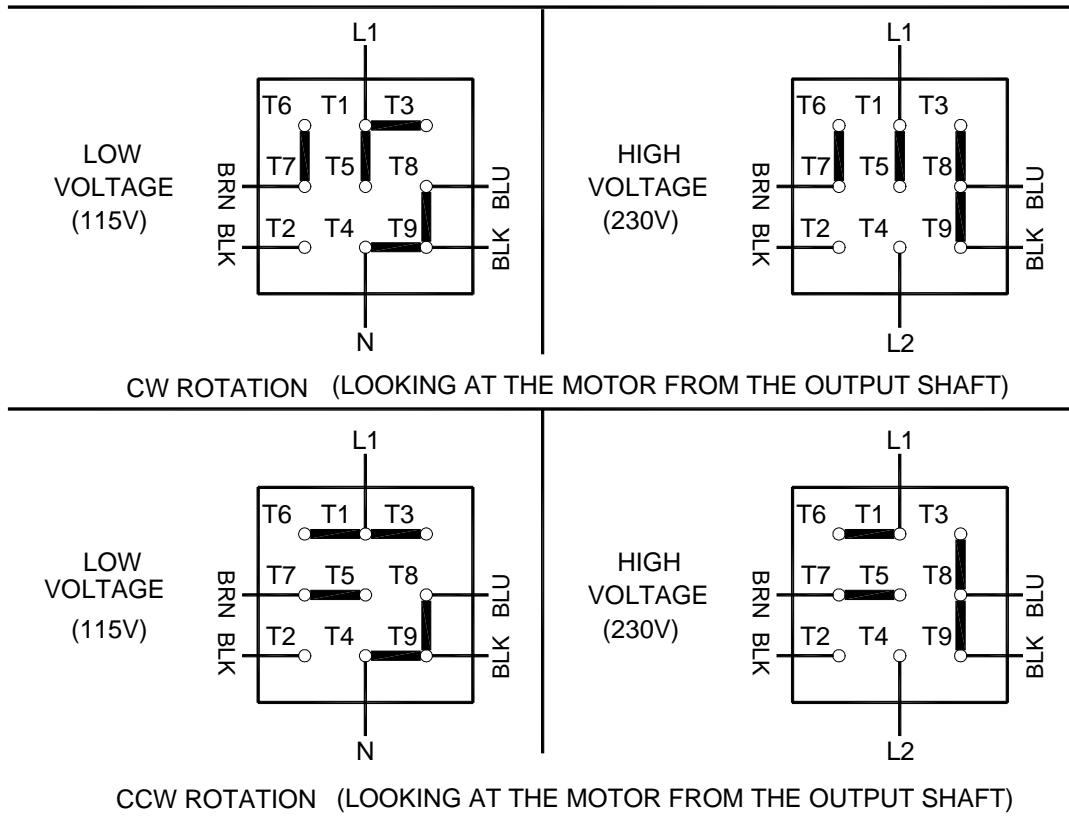
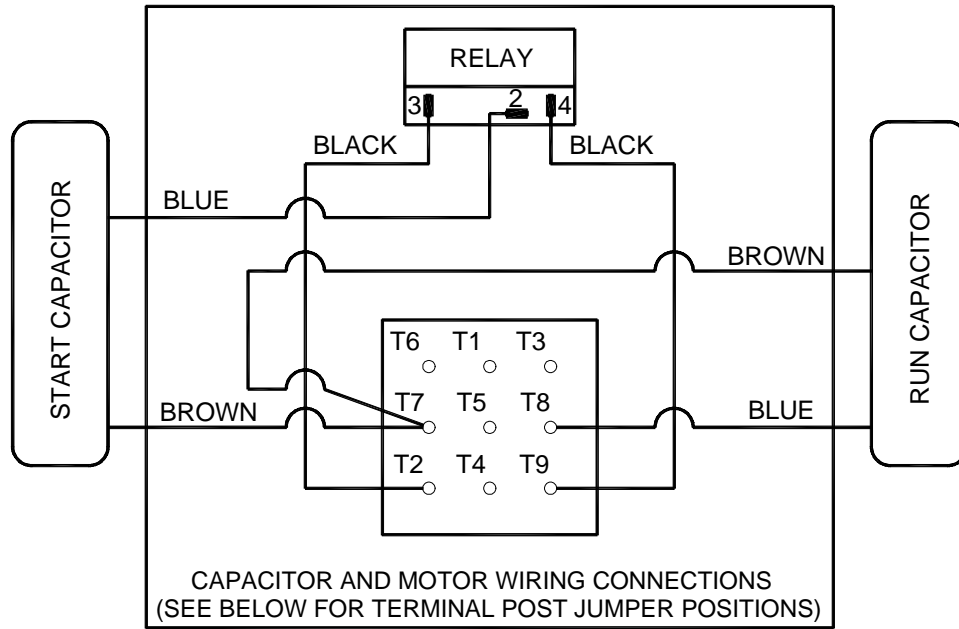
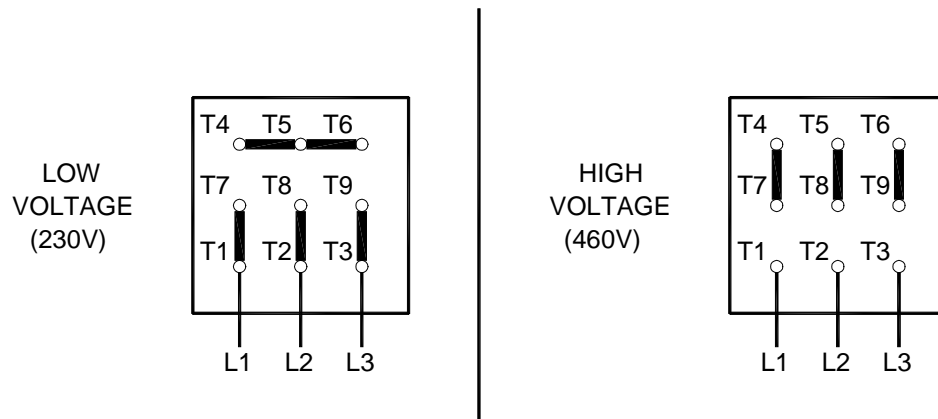


Figure 8: Wiring Diagram, 1ph Gearmotor

MIXER INSTALLATION

MOTOR WIRING CONNECTIONS AND TERMINAL POST JUMPER POSITIONS



NOTE: TO REVERSE GEARMOTOR SHAFT ROTATION,
INTERCHANGE ANY TWO LINE LEADS

CHECK MOTOR LEADS WITH CONNECTION DIAGRAMS ON MOTOR
NAMEPLATE OR CONDUIT BOX FOR PROPER WIRING

CHECK THE MIXER SHAFT ROTATION AGAINST THE PROPER
ROTATION INDICATED ON THE ASSEMBLY DRAWING

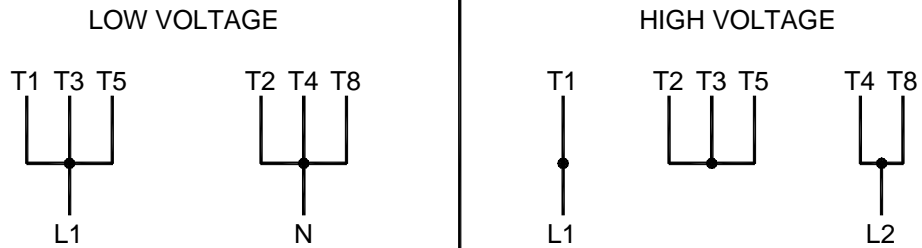
NOTE:

THE NORMAL GEARMOTOR OUTPUT SHAFT ROTATION SHOULD BE CCW
WHEN LOOKING AT THE GEARMOTOR FROM THE OUTPUT SHAFT END.
THE NORMAL MIXER SHAFT ROTATION IS CW WHEN LOOKING INTO THE
TANK FOR STANDARD ROTATION IMPELLERS.

Figure 9: Wiring Diagram, 3ph Gearmotor

MIXER INSTALLATION

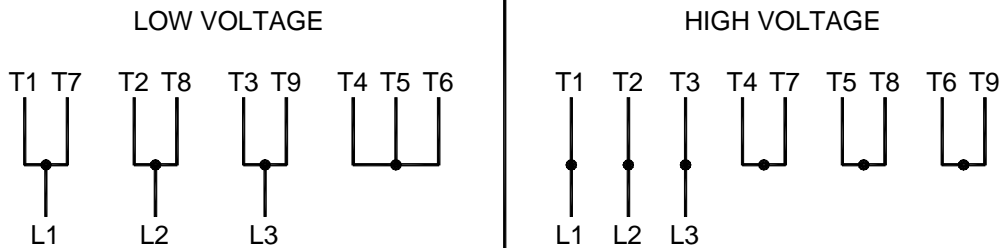
**SINGLE-PHASE MOTOR
(WITHOUT THERMAL PROTECTOR)**



CCW ROTATION (LOOKING AT THE MOTOR FROM THE SHAFT END)

NOTE: TO REVERSE MOTOR SHAFT ROTATION,
INTERCHANGE MOTOR LEADS T5 AND T8

**THREE-PHASE MOTOR
(WITHOUT THERMAL PROTECTOR)**



NOTE: TO REVERSE MOTOR SHAFT ROTATION,
INTERCHANGE ANY TWO LINE LEADS

CHECK MOTOR LEADS WITH CONNECTION DIAGRAMS ON MOTOR
NAMEPLATE OR CONDUIT BOX FOR PROPER WIRING

CHECK THE MIXER SHAFT ROTATION AGAINST THE PROPER
ROTATION INDICATED ON THE ASSEMBLY DRAWING

NOTE:
THE NORMAL MOTOR SHAFT ROTATION SHOULD BE CCW WHEN
LOOKING AT THE MOTOR FROM THE SHAFT END.
THE NORMAL MIXER SHAFT ROTATION IS CW WHEN LOOKING INTO THE
TANK FOR STANDARD ROTATION IMPELLERS.

Figure 10: Wiring Diagram, Motors

MIXER INSTALLATION**TABLE 7: BOLT TIGHTENING TORQUE**

BOLT SIZE	CARBON STEEL ⁽¹⁾				300 SERIES STAINLESS ⁽²⁾	
	GRADE 2		GRADE 5		Ft-lb	Nm
	Ft-lb	Nm	Ft-lb	Nm		
1/4-20	4.1	5.6	6	8.1	4.1	5.6
5/16-18	8.3	11	13	17	8.3	11
3/8-16	15	20	23	31	15	20
1/2-13	38	51	56	76	38	51
5/8-11	68	92	113	153	68	92
3/4-10	120	163	200	271	120	163

Tighten all fasteners to values shown unless specifically instructed to do otherwise. Lubricate all fasteners at assembly with grease, oil or an anti-seize material. Bolt threads and contact surfaces of bolt heads and nuts should be lubricated.

⁽¹⁾If fasteners cannot be lubricated, multiply table values by 1.33.

⁽²⁾If fasteners cannot be lubricated, multiply table values by 1.25.

LUBRICATION

This section defines the proper oils and greases that must be used with this equipment.

ELECTRIC MOTOR – MODEL 30DT

The motor bearings have been properly greased by the manufacturer. Motor bearings should be regreased at 12-month intervals when installed in clean, dry environments, or every six months for heavy duty and dusty locations. Any good quality general purpose grease consisting of a refined base oil stock and a lithium or calcium-complex based soap, with an NLGI No. 2 classification, will work satisfactorily. Most major oil companies offer such products, usually with extreme pressure (EP) additives for additional protection. *Table 9, page 22* lists some commonly available greases.

When regreasing, stop the motor, remove the outlet plug and add grease according to *Table 8* with a hand lever gun only. Run the motor for about ten minutes before replacing the outlet plug. Certain TEFC motors have a spring relief outlet fitting on the fan end. If the outlet plug is not accessible at the surface of the hood, it is the spring relief type and need not be removed when regreasing.

CAUTION! Overgreasing is a major cause of bearing and motor failure.

TABLE 8: MOTOR BEARING GREASE ADDITION

MOTOR FRAME SIZE	RELIANCE		LEESON		BALDOR	
	in ³	cm ³	in ³	cm ³	in ³	cm ³
56C	sealed for life		sealed for life		sealed for life	
140TC	sealed for life		sealed for life		0.6	9.8

ELECTRIC MOTOR – MODEL 30DT**TABLE 9: TYPICAL NLGI NO. 2 GREASES**

<i>For Ambient Temperature Range of 0° to 104° F (-18° to 40° C)</i>		
MANUFACTURER	GENERAL PURPOSE	EP
Amoco Oil Co.	Amolith grease: Grade 2	Amolith grease: Grade 2EP
Ashland Oil Co.		Multi-lube Lithium EP grease: Grade 2
		EP Lithium #2
Chevron U.S.A.Inc.	Industrial grease: Grade medium	Dura-Lith greases EP: Grade 2
CITGO Petroleum Corp.		Premium Lithium EP grease: Grade 2
Conoco Inc.		EP Conolith grease: Grade 2
Exxon Co. U.S.A.	Unirex N: Grade 2	Nebula EP: Grade 2
		Ronex MP: Grade 2
Mobil Oil Corp.		Mobilux EP 2
Pennzoil Products Co.		Pennlith EP grease 712
Phillips 66 Co.	Philube L Multi-purpose grease L-2	Philube EP grease: EP-2
Shell Oil Co.	Alvania grease 2	Alvania grease EP 2
		Alvania grease EP LF 2
Texaco Lubricants Co.	Premium RB grease	Multifak EP 2
Unocal 76		Unoba EP grease: Grade 2
		Multiplex EP: Grade 2

ELECTRIC MOTOR – MODEL 30DT

The following table may be used as a guide in determining frequency of lubrication. The periods listed assume a clean, dry environment with an ambient temperature not exceeding 104°F (40°C). If conditions are less desirable than this, adjust the frequency accordingly. (*Table 10* is for motor speeds 1800 RPM or slower).

TABLE 10: LUBRICATION FREQUENCY

DUTY	LUBRICATION INTERVAL (Months)
Intermittent	36
8-16 Hours/Day	30
Continuous	24

AIR MOTOR – MODEL 30DT

Lubrication of the air motor is required. An automatic air line lubricator must be installed in the air line just ahead of the air motor. The lubricator should be adjusted to feed one drop of oil for every 50-75 CFM of air going through the motor. Detergent SAE #10 automotive engine oil or equivalent is the recommended air motor lubricant.

GEARMOTOR – MODELS 20DT, 40DT

The gearmotor (gear reducer) has been permanently lubricated with mineral oil, ISO 220 grade, acceptable for operation in ambient temperatures not exceeding 104°F (40°C). The gearmotor can be operated at up to a 10 degree off vertical mounting angle, any orientation.

SHAFT SEALS

The standard DTA stuffing box contains four rings of self-lubricated packing and will not require any additional lubrication for the life of the packing.

MIXER

Proper operating procedures will allow maximum performance of your Chemineer DT Mixer. The following list will aid in the safe operation of your unit.

- **Do not** operate the unit before reading and following the instructions on all tags and nameplates attached to the unit.
- **Do not** operate the unit with less than one impeller's diameter liquid coverage above the lowest impeller. Increased side loading caused by operations at liquid level will decrease unit life.
- **Do not** operate the unit in a fluid with a specific gravity or viscosity higher than that for which the unit was designed.
- **Do not** attempt to start the unit with the mixing impeller buried in solids or a "set up" fluid.
- **Do not** locate tank internals or other rotating equipment close to the mixer impellers or extension shaft.
- **Do not** make any modifications to the mixer unit in the field (i.e. motor horsepower, mixer speed, shaft length, impeller diameter, etc.) without reviewing the change with *your local Chemineer office or Chemineer Field Service.*

CAUTION: There may be a speed range where the unit cannot be operated because of shaft resonant frequency. This range must be avoided or passed through quickly or destructive forces can be generated. Refer to main unit assembly drawing for speed range information or consult *your local Chemineer office.*

Should there be problems operating the unit, confirm that the installation is correct. If you are unable to resolve the problem, contact *your local Chemineer office.*

FLEXIBLE MOTOR COUPLING

The flexible motor coupling will provide years of operation with little maintenance or repair. If the motor/gearmotor is removed for service, the flexible coupling should be inspected for wear.

ELECTRIC MOTORS

Air circulation is very important to get full performance and long life from an electric motor. Do not block the suction inlets on fan-cooled motors. Motor life will be decreased if its temperature exceeds its thermal rating. The allowable temperature is stamped on the motor nameplate.

Prior to permanently wiring the electric motor:

- Check nameplate data on motor to assure that the available power supply agrees with the motor requirements. Protective devices should be the proper size and rating to safely carry the load and to interrupt the circuit on overloads.
- Check motor leads with connection diagrams on motor nameplate and/or conduit box so that the proper connections are made. All motors should be installed in accordance with the National Electric Code and local requirements.
- Check the output shaft rotation against the proper rotation indicated on the assembly drawing. For standard three-phase electric motors, the rotation is reversed by switching any two power leads.
- Check operating motor amperage against nameplate amperage.

The motor should start quickly and run smoothly. If the motor should fail to start or make abnormal noise, immediately shut motor off, disconnect it from the power supply, and investigate the cause. If the problem cannot be corrected, contact *your local Chemineer office* for assistance.

AIR MOTORS

Air motors are designed to be driven by compressed air. Under no circumstances should they be driven with any other type of gas, fluids, particles, solids, or any substance mixed with air.

Operating pressures should not exceed 100psi (689 kPa). The speed and torque can be regulated by using a pressure regulator or shut-off valve to obtain the desired power and to conserve air.

SHAFT SEALS

The DTA stuffing box unit consists of four rings of self-lubricated packing suitable for 50psig (345kPa) at 400°F (204°C).

At start-up, the packing should be “run-in” by tightening the hex adjusting nuts gradually (one flat at a time), allowing 15 minutes between each take-up for the packing to reseal itself before further tightening. Repeat these adjustments at 15 minute intervals until the leakage rate is acceptable.

Make periodic inspections for leakage, but do not take-up on the packing gland unless necessary. Overtightening wears out packing prematurely and causes scoring and damage to the shaft.

MIXER MAINTENANCE

Refer to *Figure 5, page 10*.

Mixer Removal & Disassembly

CAUTION: Prior to removing mixer, review the installation to assure that all safety issues are resolved.

1. Lock out and disconnect all power to the mixer motor and any optional devices.
2. Depressurize and ventilate vessel.
3. Remove the bolts [1111] and remove handhole cover [1107-02].
4. *For DTA units:* Loosen the hex adjusting nuts [1302] and bolts [1309]. Refer to *Figure 3, page 8*.

For DTL units: Loosen the bolts [1803]. Refer to *Figure 4, page 9*.

5. *For units with 1" diameter shafting and chuck drive shaft coupling:* Block extension shaft in place and loosen chuck setscrews [213].

For units with 1-1/2" diameter shafting and flanged drive shaft coupling: Block extension shaft in place, and remove coupling bolts and lockwashers [302,303].

6. Remove the mixer motor/housing assembly mounting bolts and lockwashers [252, 253].
7. Lift the mixer housing assembly from the mounting flange [1251], and move to a suitable service area. The mounting flange and shaft seal assembly should remain on the vessel with the extension shaft.
8. Remove the motor or gearmotor mounting bolts [205]. Remove the motor [100] or gearmotor [105] from the housing. The motor coupling half [151] will be attached to the motor or gearmotor output shaft. If motor servicing is required, loosen the coupling setscrews, and remove the coupling half [151] from the motor output shaft. Remove the motor key [215].
9. Rotate the chuck drive shaft [218] or flanged drive shaft [217] until the drive shaft flexible coupling half [153] setscrew is aligned with the setscrew access hole located in the housing [201-04]. Insert a 5/32" hex key wrench into the access hole and engage the setscrew. Loosen the setscrew. Rotate the drive shaft and loosen the other setscrew.

MIXER MAINTENANCE

10. Remove the drive shaft coupling half [153]. Remove the drive shaft key [219].
11. Remove the snap ring [254] from the drive shaft.
12. Mount the housing, motor mounting end up, in an arbor press. Press the drive shaft out of the housing.
13. Remove the snap ring [255] from the housing.
14. Turn the housing over, motor mounting end down, and remove the lip seal [258].
15. Press the lower bearing [256] out of the housing. The bearing spacer [257] and upper bearing [256] will also be pressed out from the housing.

The mixer drive is now fully disassembled. Clean parts and inspect for wear. Replace worn parts as required.

MIXER MAINTENANCE

Refer to *Figure 5, page 10*.

Mixer Assembly

1. Mount the housing **[201-04]**, motor mounting end up, in an arbor press. Place bearing **[256]** into upper bearing bore and press into housing. Apply press to outer race of the bearing to avoid damaging the bearing. The bearing will press through the upper bore and drop into lower bearing bore. Continue to apply press to outer race of bearing until bearing rests against lower housing shoulder.
2. Install bearing spacer **[257]** into the housing so that it rests on the inner race of the lower bearing **[256]**. Spacer should be centered with bearing bore.
3. Place another bearing **[256]** into upper bearing bore and press into housing. Apply press to outer race of the bearing to avoid damaging the bearing. Continue to press bearing into bore until bearing rests on spacer.
4. Install the snap ring **[255]** into groove in upper bearing bore.
5. Turn the housing over, motor mounting end down. Install the lip seal **[258]** into the housing (seal lip facing the bearing, flush with the bottom of the housing).
6. Support the housing, motor mounting end down, by resting the inner race of the upper bearing **[256]** on a suitable pipe or tube fixture. *NOTE: The bearing inner race must be supported while installing the drive shaft to avoid damaging the bearing.*
7. Apply grease to the lip of the lip seal **[258]**. Press the chuck drive shaft **[218]** or flanged drive shaft **[217]** into the lower bearing **[256]**, through the spacer and upper bearing, to the shoulder of the shaft.
8. Install snap ring **[254]** onto the drive shaft.
9. Install the drive shaft key **[219]**. Install the drive shaft flexible coupling half **[153]** onto the drive shaft until it rests on the shaft shoulder. Rotate the drive shaft until one of the flexible coupling setscrews is aligned with the access hole located in the housing. Insert a 5/32" hex key wrench into the housing access hole and engage the setscrew. Tighten the setscrew securely. Rotate the drive shaft and tighten the other flexible coupling half setscrew securely.
10. Install the motor or gearmotor key **[215]** onto the motor shaft using Loctite Adhesive. Install the motor shaft coupling half **[151]** so that the face of the coupling (not the teeth) is flush with the end of the motor output shaft. Tighten both flexible coupling half setscrews securely.

MIXER MAINTENANCE

11. Insert the flexible coupling rubber sleeve [152] into the drive shaft flexible coupling half.
12. Position the motor or gearmotor onto the housing, being careful to align the teeth of the motor coupling half with those in the rubber sleeve. Install the motor or gearmotor to the housing using bolts [205] and lockwashers [206]. Tighten bolts securely.

Refer to the *Mounting & Installation* section of the manual for mixer drive installation instructions.

STUFFING BOX MAINTENANCE

The DTA stuffing box is furnished with self-lubricating packing and will not require any additional lubrication for the life of the packing.

Routine maintenance consists of periodic inspections for leakage and tightening of adjusting nuts.

Stuffing Box Packing Replacement: Refer to *Figure 3, page 8*.

1. Lockout power and disconnect electrical service to motor.
2. Depressurize and ventilate vessel.
3. Remove handhole cover [1107-02].
4. Remove hex adjusting nuts [1302], lockwashers [1303], flatwashers [1304], and gland clamps [1305]. Remove split packing gland [1306]. With a packing hook (not provided), remove packing [1308].
5. Clean packing housing [1307] and extension shaft [400]. Inspect shaft surface for damage. Repair or replace shaft as required.
6. Install new packing rings [1308] into housing with packing split staggered. Seat each packing ring as it is installed. Install the split packing gland over the existing threaded studs [1301] with gland clamps [1305], flatwashers [1304], lockwashers [1303], and hex adjusting nuts [1302]. The split packing gland must be square with the packing housing.
7. Tighten the hex adjusting nuts [1302]. Let the packing set for five to ten minutes so that it can cold flow and adjust to the gland pressure. Loosen the hex adjusting nuts, then finger tighten. After starting the unit, the packing will require adjusting. Refer to ***Operation – Shaft Seals***, page 26.

V-RING SEAL MAINTENANCE

V-Ring Seal Replacement: Refer to *Figures 4 and 5, pages 9 and 10.*

1. Lockout power and disconnect electrical service to motor.
2. Ventilate vessel.
3. Remove handhole cover [1107-02].
4. Cut the existing v-ring [1801] and remove it from the shaft.
5. *For units with 1" diameter shafting and chuck drive shaft coupling:*
 - a. Block extension shaft in place and loosen chuck setscrews [213].
 - b. Remove mixer motor/housing assembly mounting bolts and lockwashers [252, 253]. Lift the mixer housing assembly from the mounting flange [1251], being carefully to lift vertically to allow the extension shaft to slide out of the drive shaft [218] chuck.
 - c. Clean all exposed shaft and seal plate [1802] surfaces and inspect for damage. Repair or replace shaft as required.
 - d. Slide new v-ring [1801] down the shaft.
 - e. Loosen the shaft blocking and lower the extension shaft approximately 2" (51mm). Re-block in place.
 - f. Lower the mixer housing assembly onto the mounting flange, being careful to lower vertically to allow the extension shaft to engage into the drive shaft chuck. Attach with bolts and lockwashers [252, 253]. Torque bolts to the value shown in *Table 7, page 20.*
 - g. Remove the shaft blocking. Raise the extension shaft [400] into the drive shaft [218] chuck until the shaft bottoms out. Orient the shaft to allow the chuck setscrews [213] (two at 90°) to engage the "flats" on the extension shaft. Tighten chuck setscrews [213] with a 3/16" hex key wrench.

V-RING SEAL MAINTENANCE

6. For units with 1-1/2" diameter shafting and flanged drive shaft coupling:
- a. Block extension shaft in place, and remove coupling bolts and lockwashers **[302, 303]**.
 - b. Remove mixer motor/housing assembly mounting bolts and lockwashers **[252, 253]**. Lift the mixer housing assembly from the mounting flange **[1251]**.
 - c. Loosen the coupling setscrews **[308]**. Remove shaft bolt, lockwasher, and flatwasher **[304, 305, 306]**. Remove the coupling half **[301-02]** and key **[307-02]** from the extension shaft.
 - d. Clean all exposed shaft and seal plate **[1802]** surfaces and inspect for damage. Repair or replace shaft as required.
 - e. Slide new v-ring **[1801]** down the shaft.
 - f. Clean the extension shaft **[400]** turndown diameter and the removable shaft coupling **[301-02]** bore. Make sure both surfaces are completely dry and free from any burrs or nicks. Install the shaft key **[307-02]** into the extension shaft keyway, making sure it is fully bottomed into the keyway. Install the coupling over the shaft end. Install the shaft end bolt, lockwasher, and flatwasher **[304, 305, 306]** and torque to the value shown in *Table 7, page 20*. Engage the two coupling setscrews **[308]** onto the shaft key **[307-02]**.
 - g. Loosen the shaft blocking and raise the shaft with coupling approximately 2" (51mm). Re-block shaft.
 - h. Lift and suspend the mixer housing assembly over the mounting flange **[1251]** and removable coupling half **[301-02]** close enough to allow the installation of the coupling bolts and lockwashers **[302, 303]**. Install two coupling bolts and lockwashers at 180°. Tighten the bolts to engage the tenon and pull the removable coupling **[301]** and flanged drive shaft **[217]** coupling faces together. Install and tighten the remaining coupling bolts and lockwashers **[302, 303]**. Lift the mixer housing assembly enough to remove the shaft blocking and gently lower the housing onto the flange. Attach the housing to the flange with bolts and lockwashers **[252, 253]**. Torque bolts to the value shown in *Table 7*.
7. Position the v-ring **[1801]** down the shaft to contact the seal plate **[1802]**.

MIXER PART NUMBERS

Part #	Description	Qty.
100	Motor	1
105	Gearmotor	1
150	Flexible Motor Coupling Assembly	
151-01	Motor Coupling Half, 56C	1
151-02	Motor Coupling Half, 140TC	1
152	Coupling Sleeve	1
153	Drive Shaft Coupling Half	1
200	Housing Assembly	
201-04	Housing, Models 20DTA/L, 30DTA/L, 40DTA/L	1
205	Socket Head Bolt	4
206	Hi-Collar Lockwasher	4
213	Setscrew, Extension Shaft/Chuck	2
215-01	Motor Key, 56C Motor	1
215-02	Motor Key, 140TC Motor/Gearmotor	1
217-01	Flanged Drive Shaft, Mate 56C/140TC	1
218-01	Chuck Drive Shaft, Mate 56C/140TC to 1" Shaft	1
219	Drive Shaft Key	1
252	Hex Bolt	4
253	Spring Lockwasher	4
254	Snap Ring	1
255	Snap Ring	1
256	Bearing	2
257	Bearing Spacer	1
258	Lip Seal	1
300	Removable Coupling Assembly	
301-02	Removable Flanged Shaft Coupling	1
302	Hex Bolt	4
303	Spring Lockwasher	4
304	Hex Bolt	1
305	Spring Lockwasher	1
306	Flatwasher	1
307-02	Key	1
308	Setscrew	2

MIXER PART NUMBERS

Part #	Description	Qty.
400	Extension Shaft	1
500	Propellers/Impellers Marine Propeller, Type JP-3 High Efficiency Impeller, Type SC-3	
1100	Handhole Cover Assembly	
1107-02	Handhole Cover	1
1111	Bolt	6
1251	Mounting Flange	1
1252	O-Ring	1
1300	Stuffing Box Assembly	
1301	Threaded Stud	2
1302	Hex Adjusting Nut	2
1303	Spring Lockwasher	2
1304	Flatwasher	2
1305	Gland Clamp	2
1306	Split Packing Gland Half	2
1307	Packing Housing	1
1308	Packing Ring	4
1309	Hex Bolt	4
1310	Spring Lockwasher	4
1311	Flatwasher	4
1800	V-Ring Assembly	
1801	V-Ring	1
1802	Seal Plate	1
1803	Socket Bolt	4
1804	Hi-Collar Lockwasher	4