

OPERATING AND MAINTENANCE INSTRUCTIONS FOR NETTCO S-SERIES

SECTION 1 - INITIAL INSPECTION, SHIPPING ARRANGEMENTS AND STORAGE



- 1.1 Check the shipping crates and your **LIGHTNIN** equipment for possible shipping damage. Report any damage immediately to the carrier and our factory.
- 1.2 The mixer and impellers are packed together. The impeller shaft, if over 48 inches (1200mm) long, is packed in a separate container.
- 1.3 Do not remove any protective coatings or wrappings until the mixer is ready to be put into service. If the mixer is to be stored, store only in an indoor, clean, dry location with controlled temperatures of 59° F to 104° F (15° C to 40° C). When gear drive models have been stored for more than one year, the gear lubricant should be replaced (see lubrication instructions). Motor shafts are to be rotated manually every month, at least 10 to 15 revolutions.
- 1.4 Lift the mixer from its crate using one of the follow lifting methods, dependant on mixer mounting style. The "P" units, which are clamp mounted to the side of the tank, are lifted as shown with a single sling, choker method. The "Q", "L", and "S" fixed mounted units should be lifted in a similar fashion using two slings directly across from each other to vertically lift the mixer. Refer to Figure 1.

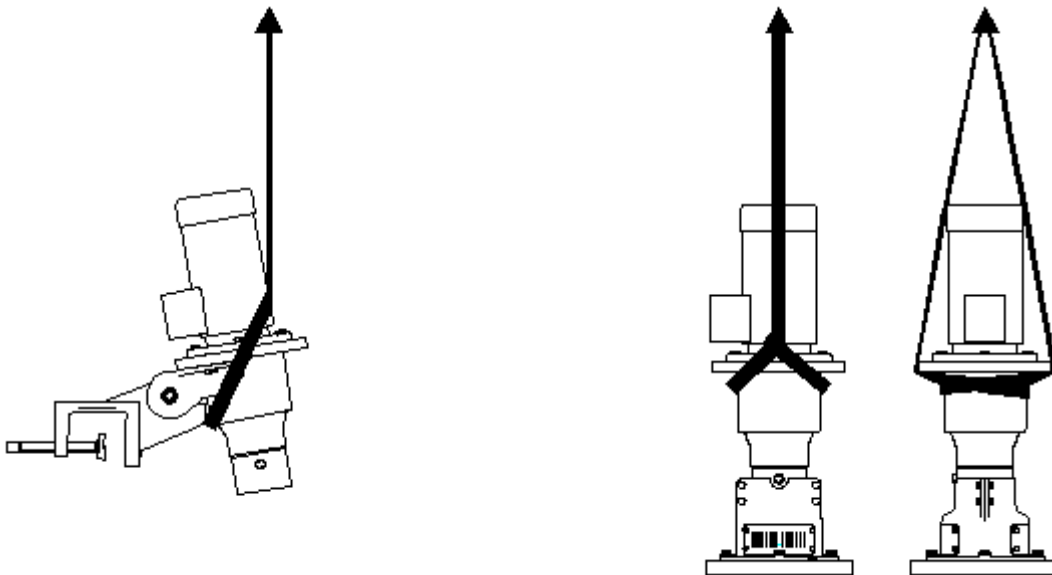


FIGURE 1

WARNING: EYE PROTECTION MUST BE WORN AT ALL TIMES WHILE SERVICING THIS MIXER.



SECTION 2 - MIXER MOUNTING CONFIGURATIONS

2.1 Refer to Dimension Drawing for mounting configuration.

a. Impeller Position Recommendations:

	Single Impeller	Dual Impeller
Basic	Position Impeller Mid Batch	Lower Impeller: 1D Off Bottom Upper Impeller: 2D Spacing
Alternate	$0.75D \leq OB \leq 1.5D$	Lower Impeller: $0.75D \leq OB \leq 1.5D$ Upper Impeller: $1.5D \leq SP \leq 2.5D$

D: Impeller Diameter

OB: Impeller Off Bottom

SP: Impeller Spacing

2.2 Lock-out power before positioning mixer, and review safety instructions before starting mixer.

2.3 "P" Units - Clamp Mounting Module - The clamps are cast offset at recommended 20° horizontal plane and adjustable 0-10° in the vertical plane. Clamps are also available with zero degree offset in the horizontal plane and adjustable 0-10° in the vertical plane. The clamp assembly (115) is fastened by hex head cap screw (112), flat washer (121), and hex nut (122) to the yoke (114). There is an anti-rotation insert (123) between the pivoting faces of the yoke (114) and clamp assembly (115). Refer to Figure 2. The yoke is bolted directly to the mixer housing module with two hex head cap screws (113).

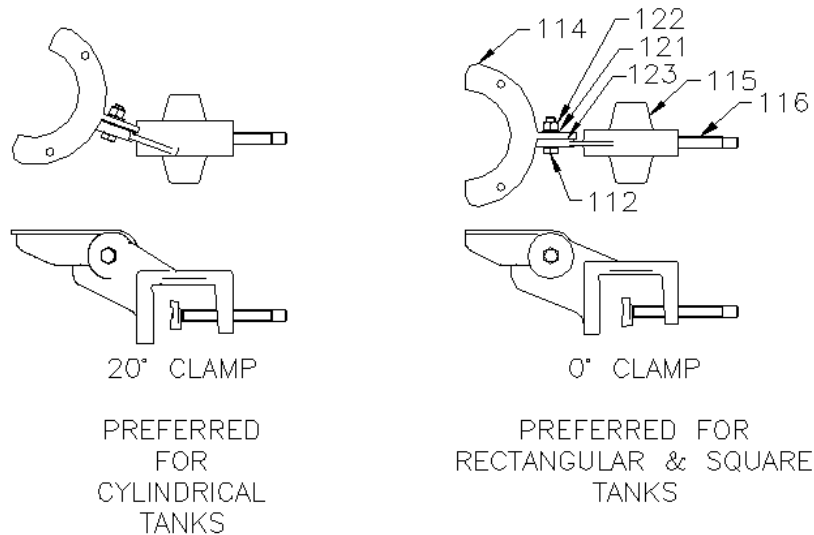


FIGURE 2

- 2.4 Loosen the clamp screw (116) sufficiently so that the clamp base will engage the tank lip or rim when the mixer is mounted. Set the clamp (115) squarely on the mounting surface so that the clamp rests on the lip of the tank, if a lip is present. Tighten the clamp screw (116) making sure the travel plate (118) is parallel to the tank lip when it contacts the tank wall. Using an M8 or 5/16" hex wrench, tighten the clamp screw to 40-50 ft-lbs (54-61 N-m) so that the mixer is held securely to the tank. **DO NOT IMPACT THE WRENCH OR USE AN EXTENSION.**
- 2.5 Refer to Figure 3 for recommended angular positions.

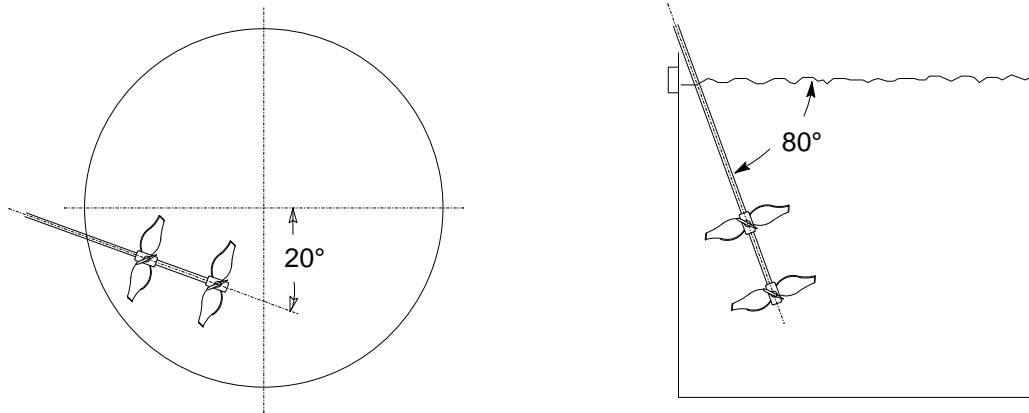


FIGURE 3

2.6 Mixer Positioning Data for fixed mounted "Q", "L", & "S" Units on unbaffled tanks. Refer to Figure 4 and Table 1.

MIXER POSITIONING DATA
BASED ON 10° ANGULAR OFF-SET MOUNTING

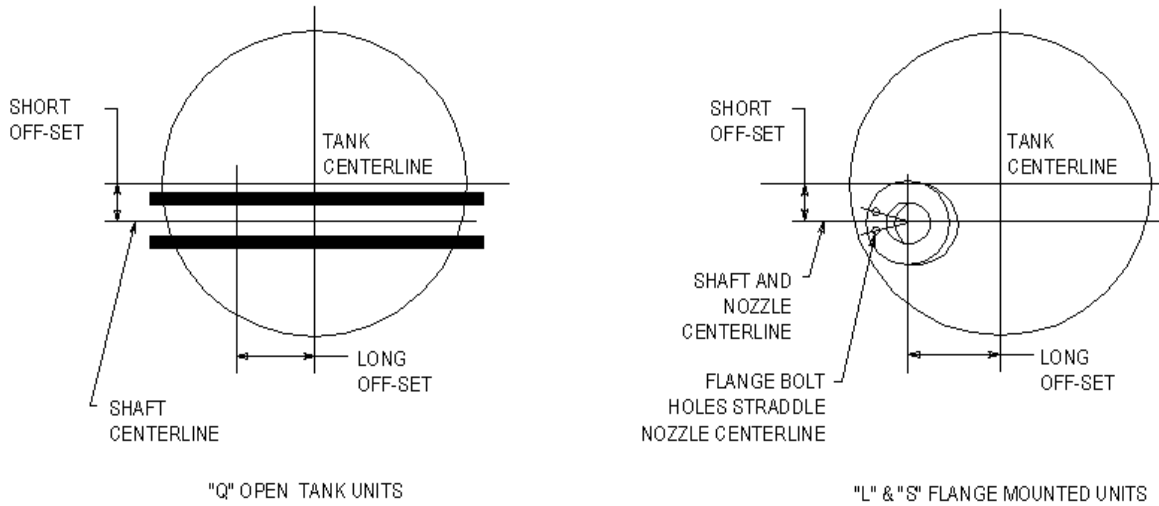


FIGURE 4

TABLE 1							
10° OFFSET – FOR TANKS WITH A Z/T LESS THAN 1.2							
TANK DIA.		MAXIMUM TANK DEPTH		MINIMUM LONG OFFSET		MINIMUM SHORT OFFSET	
INCHES	MM	INCHES	MM	INCHES	MM	INCHES	MM
24	610	36	915	6.75	170	3.88	100
27	685	41	1040	7.63	195	4.38	110
30	760	45	1145	8.31	210	4.75	120
36	915	54	1370	9.88	250	5.75	145
42	1065	63	1600	11.50	290	6.63	170
48	1220	72	1830	13	330	7.50	190
54	1370	81	2055	14.50	370	8.50	215
60	1525	90	2285	16.13	410	9.31	235
66	1675	100	2540	17.88	455	10.31	260
72	1830	108	2745	19.25	490	11.13	280
78	1980	117	2970	20.75	525	12	305
84	2135	126	3200	22.38	570	13	330
90	2285	135	3430	24	610	13.75	350
96	2440	144	3660	25.50	650	14.75	375
102	2590	154	3910	27.25	690	15.75	400
108	2745	162	4115	28.63	730	16.56	420
114	2895	171	4345	30.19	765	17.44	445
120	3050	180	4575	31.75	810	18.31	465

Z: Tank Depth

T: Tank Diameter

2.7 "Q" Units - Open Tank Mounting Module - The mixer housing module mounts in the bore of the Pedestal (111) and is secured by tightening the two hex head cap screws (110) and hex nuts (109). Refer to Figure 5.

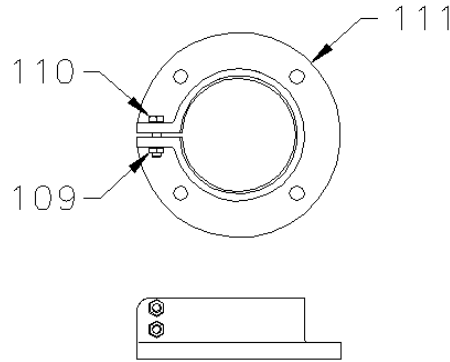


FIGURE 5

2.8 "L" Units – Closed Tank, Flange Mounted Lip Seal Module - The mixer housing module mounts in the bore of the Pedestal (111) and is secured by tightening the two hex head cap screws (110) and hex nuts (109). The pedestal (111) bolts to the mounting flange (130) with four hex head cap screws (140). Tank contents are sealed off by the flange mounted lip seal (209) which is retained by retaining ring (208). Refer to Figure 6.

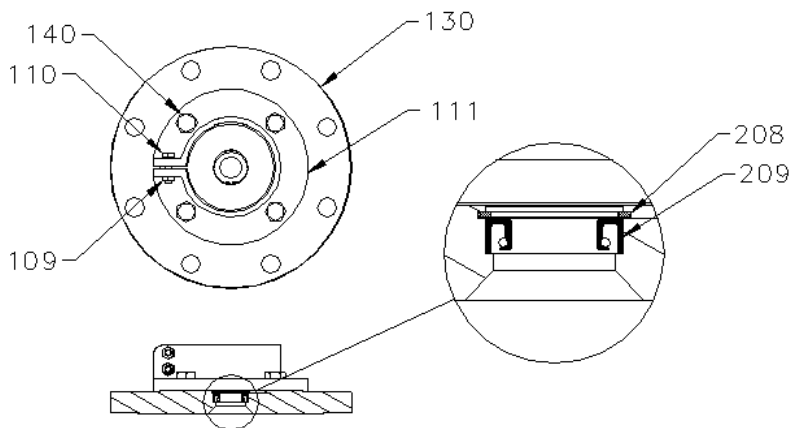


FIGURE 6

2.9 "S" Units – Closed Tank, Flange Mounted Mechanical Seal Module - The mixer housing module mounts in the bore of the Pedestal (111) and is secured by tightening the four hex head cap screws (110) and hex nuts (109). The pedestal (111) bolts to the mounting flange (130) with four hex head cap screws (150). Tank contents are sealed off by the flange mounted **LIGHTNIN** Mechanical Seal (401). Access to the **LIGHTNIN** Mechanical Seal (401) is achieved by removing the eight hex head cap screws (140) then removing the two safety covers (112). Refer to Figure 7. Assemble the **LIGHTNIN** Mechanical Seal as follows.

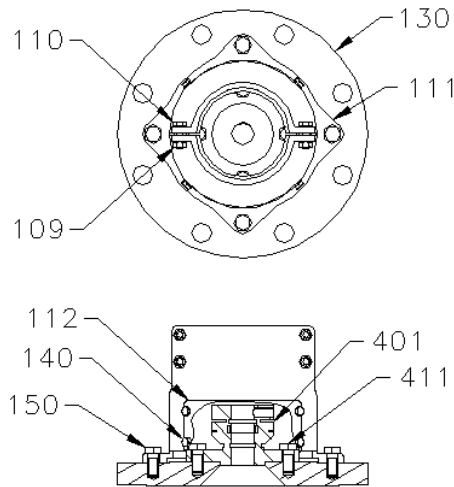


FIGURE 7

WARNING: EYE PROTECTION MUST BE WORN AT ALL TIMES WHILE SERVICING THIS MIXER.



REFER TO THE SEAL ASSEMBLY DRAWING FURNISHED IN THIS MANUAL FOR THE TYPE OF SEAL FURNISHED WITH THIS MIXER.

CAUTION: THE SEALING SURFACE OF THE STATIONARY SEALING FACE (405) AND ROTARY SEALING FACE (403) IS LAPPED AND POLISHED TO A MIRROR FINISH. IT IS IMPERATIVE THAT THESE TWO FACES BE HANDLED WITH CARE AND KEPT PERFECTLY CLEAN.

Mechanical Seal Installation:

WARNING: DISCONNECT MOTOR LEADS OR USE POWER SUPPLY LOCK-OUT PROCEDURES BEFORE SERVICING THIS MIXER.



- Install the O-ring (406) in the groove in the bottom of the stationary sealing face (405).
- Lower stationary sealing face (405) onto seal flange (130) and align with center of flange.
- Align the mounting holes in the stationary sealing face with the mounting holes in the mounting flange (130), then secure to the mounting flange with four hex head cap screws (411).
- Lightly lubricate sealing ring (407) with silicone grease.
- Insert the mixer shaft (42), up through the mounting flange (130).

- f. Carefully slide the shaft (42), through the rotary seal head (402).
- g. Refer to Section 4 for mixer shaft installation.
- h. Slide the rotary seal head (402) down into position until it just touches the face of the stationary seal face (405). Care should be taken to avoid getting silicone grease on the sealing faces.
- i. Evenly tighten spring holder set screws (412). Remove seal setting tabs (459) and store for use during seal removal.
- j. Install two safety covers (112) and secure with eight hex head cap screws (140).

Mechanical Seal Removal:

WARNING: DISCONNECT MOTOR LEADS OR USE POWER SUPPLY LOCK-OUT PROCEDURES BEFORE SERVICING THIS MIXER.



- k. Remove eight hex head cap screws (140) and two safety covers (112).
- l. Install seal setting tabs (459), then loosen spring holder set screws (412).
- m. Refer to Sections 9 or 10 for mixer shaft (42) removal procedure.
- n. Slide the mixer shaft (42) down through the rotary seal head (402).
- o. CAREFULLY remove the rotary seal head assembly (402).
- p. If removal of the stationary seal face (405) becomes necessary, remove the four hex head cap screws (150) and remove the complete mixer / pedestal assembly. The stationary seal face (405) can then be removed by removing the four hex head cap screws (411).

SECTION 3 - MOTOR CONNECTIONS

3.1 Three Phase Motors:

- a. All three phase motors must be field wired for proper rotation. If rotation does not agree with nameplate, reverse any two line leads.
- b. Dual voltage motors can be wired for the desired voltage. Refer to the connection diagrams provided on the motor nameplate and inside the conduit box cover.

SECTION 4 - MIXER IMPELLER AND SHAFT INSTALLATION

WARNING: EYE PROTECTION MUST BE WORN AT ALL TIMES WHILE SERVICING THIS MIXER.

WARNING: DISCONNECT MOTOR LEADS OR USE POWER SUPPLY LOCK-OUT PROCEDURES BEFORE SERVICING THIS MIXER.



- 4.1 Position the impeller(s), if a welded assembly is not provided, on the mixer shaft. Refer to the Section 2 for recommended dual impeller spacing.

- a. FP100 impeller - "Motor End" is cast on the upper side of the impeller. Figure 8 shows how to determine the upper face of the impeller in the event the printing becomes illegible. Note: Lettering is removed on polished impellers. Tighten impeller set screws securely. For unusually severe conditions, the shaft should be spotted for the set screws.
- b. HYDROFOIL impeller - The larger wedge shaped portion of the hub body must face up towards the mixer. The bottom of the hub is stamped "Down". Note: Stamping is not present on polished impellers. Refer to Figure 8 for general orientation reference. Tighten impeller set screws securely. For unusually severe conditions, the shaft should be spotted for the set screws.
- c. PBT impeller – Impeller orientation is not a concern since this impeller is symmetrical. Tighten impeller set screws securely. For unusually severe conditions, the shaft should be spotted for the set screws.

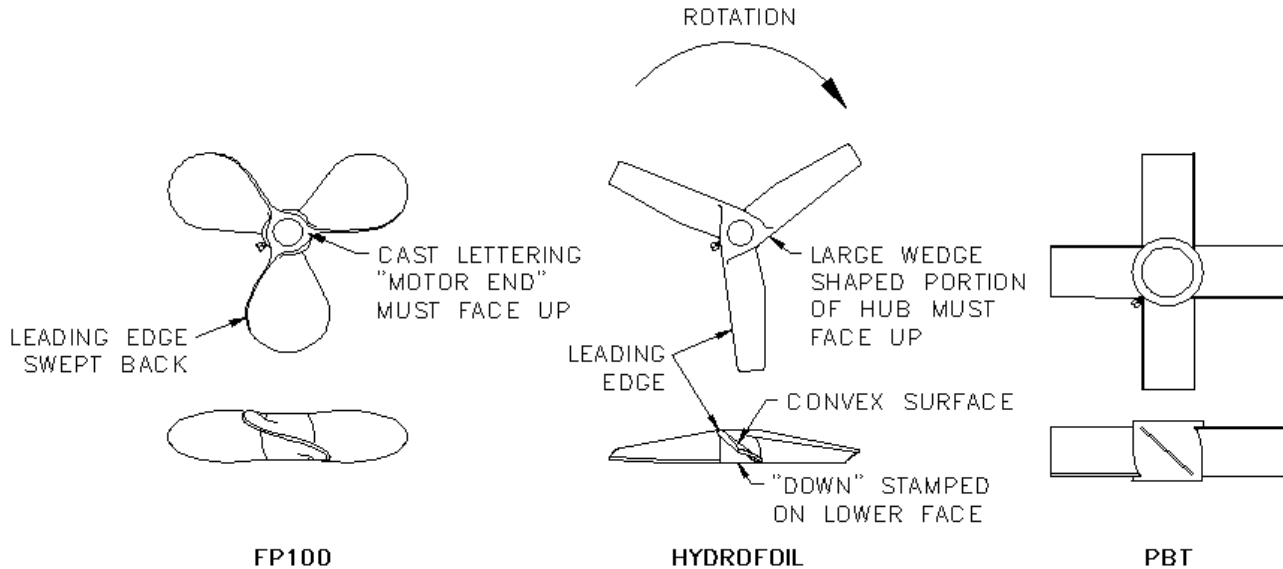


FIGURE 8

4.2 Before installing the mixer shaft (42), clean the mixer shaft end and drive quill (35) thoroughly. To install the mixer shaft, remove the access plug (97), and orient the drive quill so that the set screw (96) aligns with the access hole. Align the drive quill by inserting the mixer shaft (42) into the quill and rotate quill manually.

Insert the mixer shaft into the quill bore as far as it will go. Draw up the set screw, rotating the shaft slightly back and forth to make sure the set screw (96) seats against the flat of the shaft. Tighten the set screw(96) to 29 ft-lbs (39 Nm). **DO NOT IMPACT THE WRENCH OR USE AN EXTENSION.**

NOTE: A safety feature is provided by a slight taper in the flat on the impeller shaft. The shaft cannot drop out unless the set screw is intentionally loosened.

SECTION 5 - MIXER OPERATION

5.1 This **LIGHTNIN** mixer is designed for continuous operation, and normally needs no additional maintenance.

5.2 Variable speed units have specified critical speed ranges where the unit should not be operated during draw off condition or operated in air.

CAUTION: THESE CONDITIONS MUST BE AVOIDED WHEN THE UNIT IS BEING OPERATED WITH A VARIABLE SPEED DRIVE. IT IS ALSO NOT RECOMMENDED TO OPERATE THE MIXER WITH EXTREME VORTEXING OR SURGING OF THE LIQUID BEING MIXED.

5.3 All bolts should be retightened 12 hours after assembly, and at each scheduled shut down thereafter.

5.4 Turn on the mixer. Allow time for the mixing pattern to be established, then make any required adjustments of position as outlined in Section 2 of these instructions.

SECTION 6 - BOLT TIGHTENING TORQUE RECOMMENDATIONS

Inadequately or improperly tightened hardware can loosen due to vibration or the load reactions imposed by fluid forces. This can result in reduced equipment service life or damage and failure.

6.1 Recommended torques for tightening metric bolts and screws on **LIGHTNIN** mixers and their mounting structures are listed in Table 2 for your general reference. These average torque values should be considered only as guides and not as absolute values.

The amount of torque required to maintain a tight connection can vary considerably for bolts of the same size under different operating conditions. Variations such as basic joint design, compression factors, type and strength of base and hardware material, surface finish of mating parts and lubrication are only some of the factors that influence the tightness of bolted connections for given bolt torques.

UNLESS SPECIFICALLY LISTED ELSEWHERE IN THE DETAILED INSTRUCTIONS, TIGHTEN THE MIXER AND MOUNTING HARDWARE TO THE RECOMMENDED TORQUES IN TABLE 2. A torque wrench must be used to insure compliance with these torque requirements.

Certain assembly connections may require special torques which are not listed in the table. These torques can be found in the detailed assembly and disassembly sections of your manual. REVIEW YOUR MANUAL CAREFULLY TO DETERMINE WHERE SPECIAL TORQUES ARE REQUIRED.

ALL BOLTS SHOULD BE RETIGHTENED 12 HOURS AFTER ASSEMBLY, AND AT EACH SCHEDULED SHUT DOWN THEREAFTER.

**TABLE 2
RECOMMENDED TIGHTENING TORQUES FOR COMMERCIAL
GRADE STEEL, GR5, 304 AND 316 STAINLESS STEEL (1) (2)**

BOLT THREAD SIZE	TIGHTENING TORQUES (FT-LBS) (3) GRADE 5.6 OR 304/316 SS BOLTS LUBRICATED	TIGHTENING TORQUES (FT-LBS) (3) GRADE 8.8 BOLTS LUBRICATED	ISO MARKING REFERENCE GUIDE (2)
M5	1.7	4.1	HEX HEAD CAP SSREWS
M6	3.0	7.0	
M7	5.0	12	
M8	7.0	17	
M10	14	34	
M12	25	59	
M14	39	93	
M16	62	146	HEX NUT
M18	85	200	
M20	120	284	
M22	178	386	
M24	207	491	
M27	303	718	
M30	412	975	
M33	561	1327	SOCKET HEAD CAP SSREWS
M36	720	1704	
M39	932	2205	
M42	1153	2727	

(1) ALL BOLTS SHOULD BE COATED WITH OIL, GREASE OR AN ANTI-SEIZE COMPOUND WHENEVER POSSIBLE. THE THREADS AND BEARING FACE OF BOLT HEADS AND/OR NUTS SHOULD BE LUBRICATED.

(2) TORQUE VALUES SHOWN SUPERSEDE PREVIOUS TABLES THAT MAY HAVE ALLOWED LOWER VALUES. IT IS RECOMMENDED THAT ONLY FASTENERS BE USED THAT ARE PROPERLY MARKED, INCLUDING MANUFACTURER'S TRADE MARKING. ONLY FASTENERS MARKED AS SHOWN ARE GUARANTEED TO MEET SPECIFICATION AND PERFORMANCE REQUIREMENTS.

(3) CONVERSION FACTORS:

FRICITION LOCKING DEVICES MULTIPLY LUBRICATED VALUE BY 1.15. THESE TORQUES PERTAIN TO BOLTS OR NUTS WITH FRICTION LOCKING DEVICES SUCH AS NYLON PELLETS OR PATCHES, FIBER INSERTS OR UPSET THREADS.
DRY VALUES MULTIPLY LUBRICATED VALUE BY 1.33.

METRIC VALUES IN N-m 1FT-LB = 1.3558 N-m

SECTION 7 - LUBRICATION

- 7.1 Your **LIGHTNIN** mixer has been lubricated at the factory with the correct type and amount of high quality lubricants. Lubricant cleanliness is protected by properly designed closures.
- 7.2 All mixer bearings are sealed type and are pre-packed with lubricant. Relubrication of these bearings is not necessary.
- 7.3 The gear chamber in **LIGHTNIN** MS5(P,Q,L, or S) & MS6(P,Q,L, or S) Series mixers has been factory filled with a grease suitable for ambient temperature ranges of -4° F to +122° F (-20° C to +50° C). Under normal operating conditions, this lubricant need not be changed until the unit has been dismantled for some reason. Refer to Table 3 for lubricant specifications.
- 7.4 Under adverse operating conditions, periodic changes of lubricant may be necessary. Adverse conditions are defined as operating in very humid, dust laden, chemical atmospheres, or where wide variations in ambient temperatures occurs. Such adverse conditions can lead to deterioration of lubricant compounds and additives, and it is recommended that the condition of the grease be checked within six months of start-up.

Refer to Section 10 for instructions on disassembling the gear drive.

NOTE: THE GEAR CHAMBER SHOULD BE FILLED PER TABLE 3 CAPACITIES. ALL SEALING SURFACES SHOULD BE CLEANED AND NEW GASKET ELIMINATOR APPLIED. LOCTITE GASKET ELIMINATOR 504 SEALANT IS RECOMMENDED BY THE FACTORY.

MODEL		RECOMMENDED GREASE	GREASE CAPACITY	
		FOOD GRADE	LBS.	kg
50Hz	MS5 & MS6 (P,Q,L,S) 1	BEL-RAY NO-TOX HD 0	.9	.4
	MS5 & MS6 (P,Q,L,S) 2-5		1.6	.7
	MS5 & MS6 (P,Q,L,S) 6		1.6	.7
60Hz	MS5 & MS6 (P,Q,L,S) 1		.9	.4
	MS5 & MS6 (P,Q,L,S) 2-5		1.6	.7
	MS5 & MS6 (P,Q,L,S) 6		1.6	.7

TABLE 3

FOOD GRADE GREASE (PART NUMBER 275255PSP – 14 OZ. TUBE) IS AVAILABLE.

7.5 An alternate method to achieve the proper amount of grease required, is to measure from the top of the mixer housing (36) down to the grease level as shown in Figure 9.

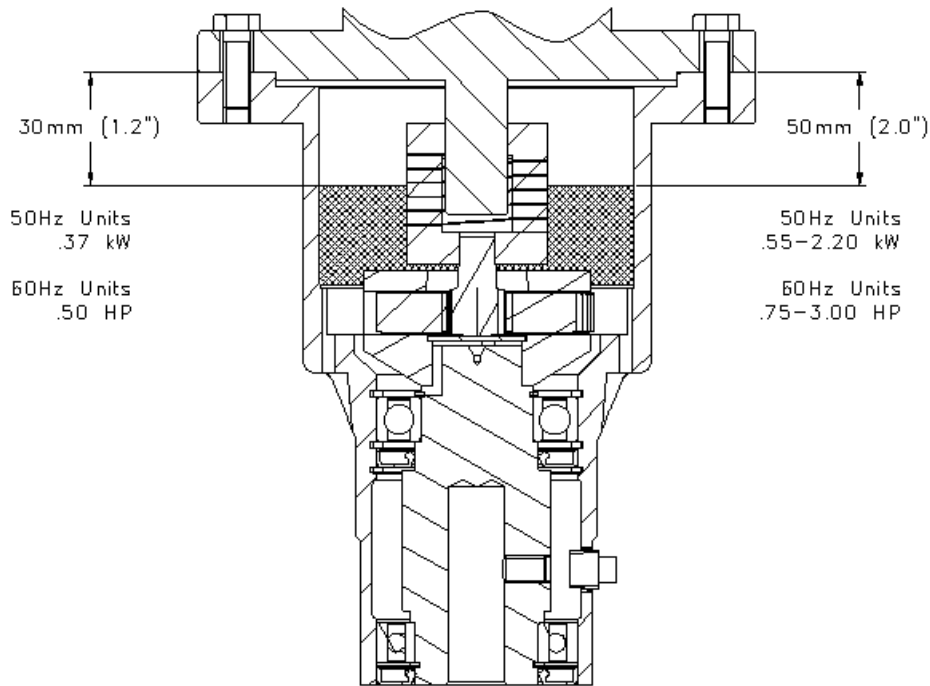


FIGURE 9

7.6 CHANGING GEAR LUBRICANT

Food Grade Grease: Gear sets are initially lubricated at the factory with Bell-Ray No-Tox HD 0 grease. This is the optimum lubricant. **NO OTHER FOOD GRADE GREASE IS ALLOWED.** It will give the best performance, with no derate necessary, and is available from **LIGHTNIN**.

- a. Make sure the gear housing is vertical to prevent spillage.
- b. Remove all old grease from the gear chamber and wipe the gear chamber clean.
- c. Pack the gear chamber with fresh grease (see Table 3 or Figure 9). Paddle the grease to fill voids and remove air pockets, rotating the shaft and shaking the housing while paddling.
- d. Check for free movement of all components by rotating the drive shaft. If satisfactory, refer to Section 10 and complete assembly.

SECTION 8 - PREPARATION FOR DISASSEMBLY AND ASSEMBLY

WARNING: DISCONNECT MOTOR LEADS OR OTHERWISE LOCK-OUT POWER SUPPLY BEFORE SERVICING THIS MIXER. EYE PROTECTION MUST BE WORN.



8.1 GENERAL - **LIGHTNIN** mixers are precision manufactured and assembled to provide long, trouble free service when properly maintained. If it becomes necessary to disassemble the unit, careful, precise reassembly is necessary.

Refer to the assembly drawing for location of parts. Equipment that will be required to service the mixer, in addition to standard mechanics tools, is a rubber mallet, retaining ring pliers, arbor press and torque wrench. When disassembling the mixer, clean adjacent external surfaces to prevent dirt from entering the housings. It is recommended that oil seals be replaced and gasket eliminator sealer be reapplied when the mixer is disassembled.

8.2 SEAL REPLACEMENT

New oil seals should always be used. Drive out all old oil seals and remove accumulations of sealing compound. When replacing seals:

- a. Coat the lips of seals with bearing grease.
- b. Install oil seals with the lip facing in the direction indicated on the assembly drawing.
- c. Coat the section of the shaft sealing surface with oil. If the oil seal must pass over a keyway, wrap the shaft with thin paper or tape, coat with grease, and pass the seal over.

8.3 BEARING REPLACEMENT

Inspect the bearings carefully and replace if necessary.

- a. Old bearings can be removed with a puller or an arbor press.
- b. New bearings can be pressed onto the shafts. Be careful to apply load only to the inner race.
- c. Make sure the bearings are tightly seated against the shaft or housing shoulder with no clearance.

SECTION 9 - DISASSEMBLY AND ASSEMBLY OF DIRECT DRIVE UNITS

DISASSEMBLY:

9.1 MOTOR REMOVAL

- a. Remove set screw access plug (97) from the mixer housing (36).
- b. Remove the impeller shaft (42) from the drive quill (35), by loosening the set screw (96) enough to release the impeller shaft. The impeller shaft is now free from the chuck and can be withdrawn.
"P" Units: Turn the clamp screw counterclockwise to loosen the clamp assembly (116). Remove the mixer from the tank. Remove the yoke / clamp assembly (114 / 115), from the housing (36) by removing the two hex head cap screws 113).
- "Q" & "L" Units: Hold the two hex head cap screws (110) and loosen the two hex nuts (109). Remove the mixer from the pedestal (111).
- "S" Units: Hold the four hex head cap screws (110) and loosen the four hex nuts (109). Remove the mixer from the pedestal (111).
- c. Set the mixer upright on a workbench.
- d. Remove the four hex head cap screws (160), (or four nuts 161 on D70 and D90 motors) holding the motor (101) to the housing (36).
- e. Separate and remove the motor (101) from the housing (36). One half of the motor coupling half (150) will remain attached to the motor shaft.
- f. Loosen the set screw, and remove the motor coupling half (150) and key (106).
- g. Loosen the set screw, remove the quill shaft coupling half, and coupling insert.

9.2 QUILL SHAFT & HOUSING DISASSEMBLY

- a. Place the housing (36) upright on a workbench and remove the retaining rings (44 & 56).
- b. Place the housing upright in a press, and press out the quill shaft (35), bearing (41) and oil seal (49).
- c. Press the lower bearing (41) off the shaft.
- d. Turn the housing over and press out the upper bearing (37).
- e. Remove lower retaining ring (44), only if necessary.
- f. Inspect the bearings (37 & 41). Replace if there is excessive wear.

ASSEMBLY:

9.3 PREPARING FOR ASSEMBLY

- a. Clean all parts thoroughly.
- b. Inspect for the following defects:
 1. Cracks or damage of the housing.
 2. Dents, gouges or scoring of the drive shaft, housing bore, and particularly the mating faces of the motor and housing.
- c. Repair or replace defective parts. It is good practice to replace an oil seal which has been removed from the housing. Apply a small quantity of bearing grease to the housing bore, and around the oil seal lip to provide lubrication and make the seal more effective.
- d. Replace the bearings if they show indications of wear.

9.4 QUILL SHAFT ASSEMBLY

- a. Press the lower bearing (41) onto the quill shaft (35). The bearing must seat against the shoulder with no visible gap.

9.5 QUILL SHAFT AND HOUSING ASSEMBLY

- a. Install the lower retaining ring (44), if removed, in the housing (36).
- b. Mount the housing (36) in an arbor press, large end up.
- c. Press the bearing (37) on its outer race to seat against retaining ring (44).
- d. Install the upper retaining ring (44).
- e. Support the housing, large end down, by resting the inner race of the bearing on a suitable sleeve.
- f. Press the quill shaft (35) into the bearing until the shoulder of the shaft registers against the inner race of the bearing.
- g. Install the upper retaining ring (56) in the shaft groove.
- h. Turn the housing large end down, and press the lower oil seal (49) until it is flush with the end of the housing.

9.6 MOTOR COUPLING ASSEMBLY

- a. Position the motor coupling hub (150) as shown in Figure 10.
- b. Tighten the set screws.
- c. Place the drive coupling half and key onto the quill shaft until it bottoms on the shaft shoulder. Tighten the set screw.
- d. Install the coupling insert into the quill shaft coupling half.

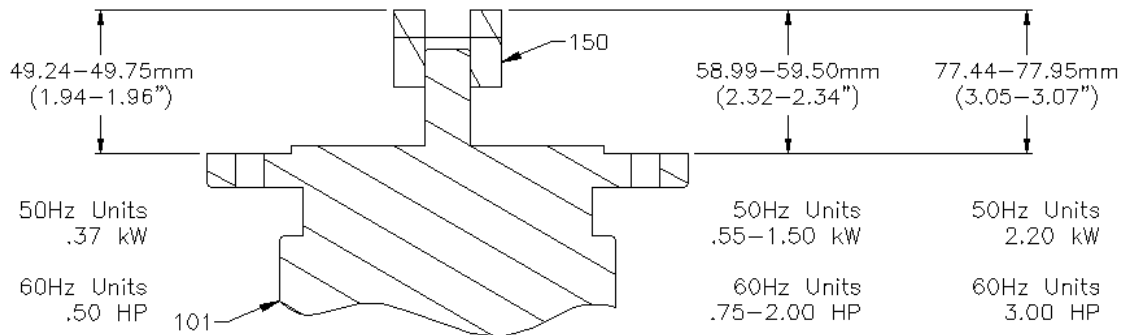


FIGURE 10 – MOTOR COUPLING PLACEMENT

9.7 MOTOR ASSEMBLY

- a. Apply LOCTITE GASKET ELIMINATOR 504 SEALANT on the motor mounting face of the housing (36).
- b. Align the housing so the set screw access hole is to the right. Orient the motor, so the conduit box (or junction box) of the motor is facing you.

- c. Move the motor, over the housing (36) and align the motor coupling (150) with the coupling insert on the quill shaft coupling half.
- d. Once the coupling halves engage, align the housing rabbets, screw holes, and conduit box (or junction box) of the motor, with the set screw access hole in the housing, to the right.

Note: Units using D80 and D90 frame motors will use a spacer ring (98) on motor rabbet to mixer housing rabbet connection.

- e. Install the housing cap screws (160) (or four nuts 161 on D70 and D90 motors) and tighten evenly.

9.8 MIXER MOUNTING

- a. Refer to Section 2 for attachment of applicable mounting configuration.

SECTION 10 - DISASSEMBLY AND ASSEMBLY OF GEAR DRIVE UNITS

DISASSEMBLY:

10.1 MOTOR REMOVAL

- a. Remove set screw access plug (97) from the mixer housing (36).
- b. Remove the impeller shaft (42) from the drive quill (35) by loosening the set screw (96) enough to release the impeller shaft. The impeller shaft is now free from the chuck and can be withdrawn.
"P" Units: Turn the clamp screw counterclockwise to loosen the clamp assembly (116). Remove the mixer from the tank. Remove the yoke / clamp assembly (114 / 115), from the housing (36) by removing the two hex head cap screws 113).
- "Q" & "L" Units: Hold the two hex head cap screws (110) and loosen the two hex nuts (109). Remove the mixer from the pedestal (111).
- "S" Units: Hold the four hex head cap screws (110) and loosen the four hex nuts (109). Remove the mixer from the pedestal (111).
- c. Set the mixer upright on a workbench.
- d. Remove the four hex head cap screws (160) (or four nuts 161 on D70 and D90 motors) holding the motor (101) to the mixer housing (36).
- e. Separate and remove the motor (101) from the mixer housing (36). The helical coupling (150) and sun gear will remain attached to the motor shaft.
- f. Move the mixer housing over a suitable container, remove the old lubricant and dispose of properly.
- g. Remove the sun gear (9) and motor coupling (150).
- h. Remove the gear carrier assembly (1), retaining ring (7), ring gear (2), four dowel pins (5) and any remaining old lubricant.

10.2 QUILL SHAFT & HOUSING DISASSEMBLY

- a. Place the housing (36) upright on a workbench and remove the retaining rings (44 & 56).
- b. Place the housing upright in a press, and press out the quill shaft (35), bearing (41) and oil seal (49).
- c. Press the lower bearing (41) off the shaft.
- d. Turn the housing over and press out the upper bearing (37).
- e. Turn the housing over, remove middle retaining ring (44).
- f. Turn the housing over and press the oil seal (38), from the housing (36).
- g. Inspect the bearings (37 & 41). Replace if there is excessive wear.

ASSEMBLY:

10.3 PREPARING FOR ASSEMBLY

- a. Clean all parts thoroughly.
- b. Inspect for the following defects:
 1. Cracks or damage of the housing.
 2. Dents, gouges or scoring of the quill shaft, housing bore, and particularly the mating faces of the motor and housing.

- c. Repair or replace defective parts. It is good practice to replace an oil seal which has been removed from the housing. Apply a small quantity of bearing grease to the housing bore, and around the oil seal lip to provide lubrication and make the seal more effective.
- d. Replace the bearings if they show indications of wear.

10.4 QUILL SHAFT ASSEMBLY

- a. Press the lower bearing (41) onto the quill shaft (35). The bearing must seat against the shoulder with no visible gap.

10.5 QUILL SHAFT AND HOUSING ASSEMBLY

- a. Install the lower retaining ring (44) in the housing (36).
- b. Mount the housing (36) in an arbor press, large end up.
- c. Press the oil upper seal (38) into the housing (36) with the seal cavity facing the large end of the housing.
- d. Install the middle retaining ring (44) in the housing (36).
- e. Press the bearing (37) on its outer race to seat against the middle retaining ring (44).
- f. Install the upper retaining ring (44).
- g. Support the housing, large end down, by resting the inner race of the bearing on a suitable sleeve.
- h. Press the quill shaft (35) into the bearing until the shoulder of the shaft registers against the inner race of the bearing.
- i. Install the upper retaining ring (56) in the shaft groove.
- j. Turn the housing large end down, and press the lower oil seal (49) until it is flush with the end of the housing.

10.6 GEAR ASSEMBLY

- a. Install the ring gear retaining pins (5).
- b. Install the ring gear (2) in the bearing housing (36).
- c. Install the retaining ring (7) in the groove above the ring gear.
- d. **PACK THE GEAR CARRIER (1) WITH GREASE** and rotate the gears several times to distribute the grease to the needle bearings (13). Refer to Section 7 of these instructions for lubricant recommendations.
- e. 50Hz Units, .37-1.50 kW and 60Hz Units .50-2.00 HP: Align the flats on the inside of the gear carrier (1) with the flats on the quill shaft (35).
- f. 50Hz Units, 2.20kW and 60Hz Units 3.00 HP: Install the key (27) in the quill shaft (35). Align the keyway in the gear carrier (1) with the keyway on the quill shaft (35).
- g. Place the gear carrier assembly onto the quill shaft.

10.7 MOTOR COUPLING ASSEMBLY

- a. Assemble the sun gear (9), the drive coupling (150) and key (Item 107 – On all models except: 50Hz .37kW and 60Hz .50 HP sizes) until the sun gear shoulders against the drive coupling. Tighten the set screws.
- b. Set the elevation of the sun gear to the dimension shown in Figure 11, and tighten the remaining set screws.

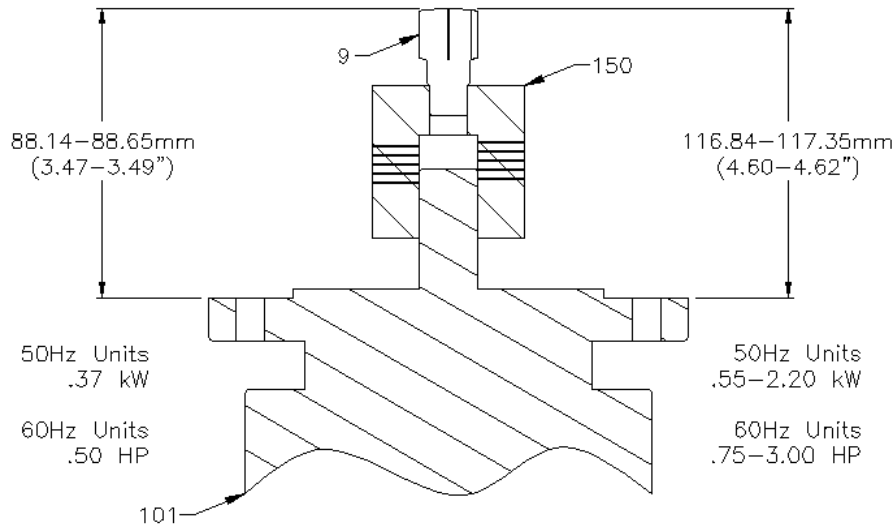


FIGURE 11 – SUN GEAR PLACEMENT

- c. Fill the gear housing with lubricant. Refer to Section 7 of these instructions for lubricant recommendations.

10.8 MOTOR ASSEMBLY

- a. Apply LOCTITE GASKET ELIMINATOR 504 SEALANT on the motor mounting face of the housing (36).
- b. Align the housing so the set screw access hole is to the right. Orient the motor, so the conduit box (or junction box) of the motor is facing you.
- c. Move the motor, over the housing (36) and align the sun gear (9) in the center of the gear carrier so it meshes with the planet gears.
- d. Once the gears engage, align the housing rabbets, screw holes, and conduit box (or junction box) of the motor, with the set screw access hole in the housing, to the right.

Note: Units using D80 and D90 frame motors will use a spacer ring (98) on motor rabbet to mixer housing rabbet connection.

- e. Install the housing cap screws (160) (or four nuts 161 on D70 and D90 motors) and tighten evenly.

10.9 MIXER MOUNTING

- a. Refer to Section 2 for attachment of applicable mounting configuration.