



INSTALLATION, OPERATION & MAINTENANCE Instructions for CLEVELAND MIXER AL/ALD/AD Agitator Series

Models: AL - Single Reduction,
ALD - Double Reduction,
AD - Triple Reduction
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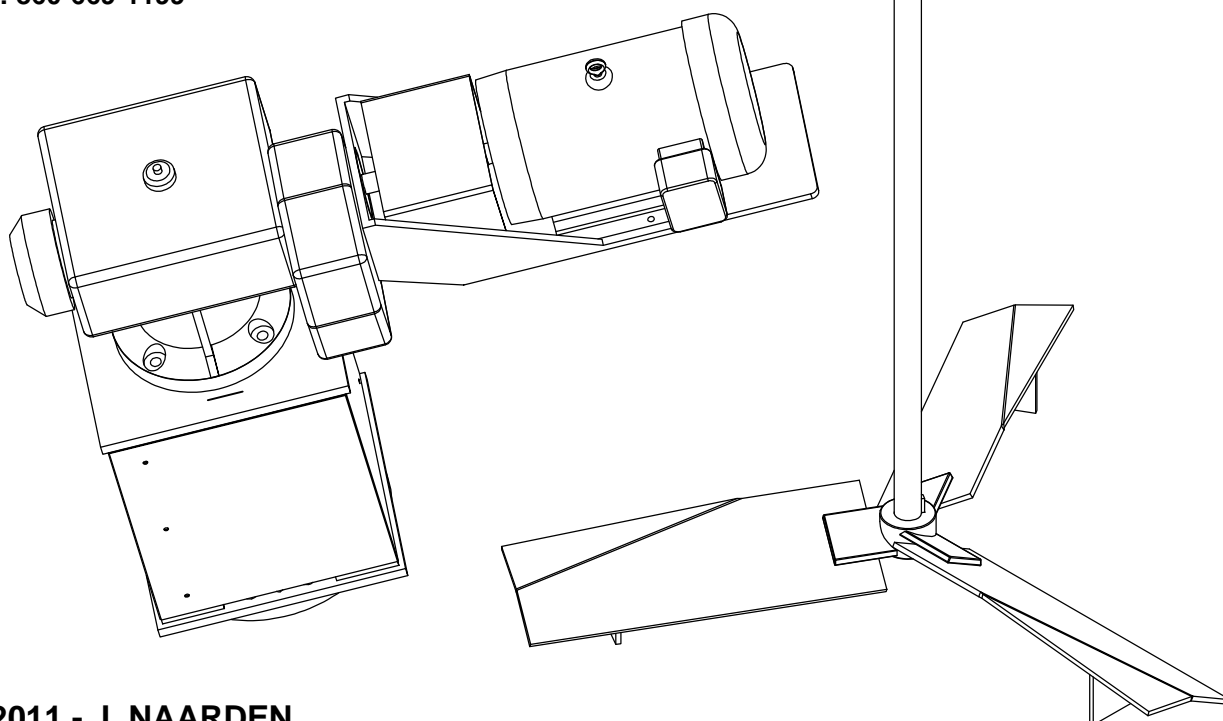


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INTRODUCTION

HOW TO USE THIS MANUAL

This Owner's Manual provides information and instructions on the installation, operation and maintenance of Cleveland Model AL, ALD and AD Mixers. The Table of Contents will help you find any information you might need. To obtain maximum performance and trouble free service from this Cleveland equipment, follow all instructions carefully. The Cleveland Mixer Division of Subiaco offers installation service, maintenance seminars and aids in planning spare parts programs. Contact Cleveland Mixer for details

UNIT RATINGS & APPLICATIONS

Operate mixer reducers only at the horsepower and speed indicated on the nameplate. All "A" series mixers are designed to operate with the output shaft in a vertical position. Consult Cleveland Mixer before making any changes in operating conditions of "A" series units, differing from "as built".

WARRANTY

Cleveland Mixer warrants that, for a period of one year from the date of shipment, the product described herein will successfully deliver its rated output as indicated in the quotation, provided it is properly installed, maintained, correctly lubricated and operated in the environment within the limits of speed, torque or other load conditions for which it was designed. Unapproved modifications to the equipment and/or running the equipment in any other way than what it was originally designed for voids the warranty.

The Cleveland Mixer warrantee applies to only items furnished by Cleveland Mixer. All other equipment (tanks, mounting structures, power sources, process equipment) & designs are the responsibility of others. Cleveland Mixer does not warrant, guarantee or assume any responsibility for the design or construction of the mounting structure for the mixer.

HOW TO CONTACT US

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INTRODUCTION

IMPORTANT INFORMATION ABOUT YOUR AL DRIVE

Because of their unique worm and gear design, Cleveland "A" series worm gear sets operate with multiple tooth contact at all times. This ensures consistent power delivery. As a result, operation is smooth and extremely quiet, normally in a sound range of 76 to 80 dBA.

Single reduction worm gear sets can easily provide gear reductions of 5:1 through 70:1, for output speeds down to 25RPM (using standard 1750 rpm motors). With double reduction helical-worm gear reducers, gear reduction can go from 15:1 to 350:1 ratio to provide output speeds as low as 5 rpm. This allows economical yet efficient mixing at lower speeds.

Please remember that gearing efficiency is quite different from mixing efficiency. While mixing efficiency is influenced by gearing efficiency, it also depends on other factors, such as the impeller and motor.

Cleveland "A" series mixer drives are engineered to withstand up to 300 % momentary peak overloads and startup loads. Never start your mixer while the impeller is buried in solids. The minimum service factor for Cleveland "A" series mixer drives is 1.25.

Cleveland heavy duty "A" series drive units come equipped with heavy duty Timkin roller bearings (B-10 life over 10,000 hours on the high speed worm shaft; B-10 life of 100,000 hours on the low speed shaft) which minimize shaft vibration and sensitivity to shaft deflection. This eliminates the need for hollow quill construction.

INSTALLATION

Uncrating & Inspection

Be sure to use care when uncrating and handling the mixer. Certain parts such as turbine hubs, turbine blades, couplings, steady bearings, seals, hardware, spare parts and accessories may be packed in boxes or inside of the crate.

Make sure all components are accounted for before discarding the packaging materials or crates. It is common for parts to be missed or overlooked.

The mixer should be carefully checked for possible shipping damage at the time of delivery. Any damage should be reported immediately to the TRANSPORTATION COMPANY AND CLEVELAND MIXER.

Improper handling may cause damage to the mixer and reduce the service life. The shaft has been straightened to within .003" per foot. Extra care should be taken to see that it is not damaged in the process of uncrating.

Lifting & Moving

Always use a crane, hoist or other mechanical assistance to move "A" series units. Exercise care to prevent damage when moving. Lift only at designed lift points. Insure that adequate safety measures are taken to protect personnel during transportation. Protect the mounting surface from damage.

INSTALLATION

Pre Installation Check List

Most mixer operational problems can be avoided by following the included installation and operation instructions. The following is a list of suggestions to help ensure proper installation and therefore satisfactory mixer service.

- 1 Before permanently wiring the motor, check for the correct rotation of the shaft. Standard rotation is clockwise when looking down from the top. Gear reducers reverse rotation, take that into account when wiring. All wiring should be done by a qualified electrician.
- 2 Read and follow the instructions of all tags and nameplates before operating.
- 3 Check the operating full load motor amperage and voltage before operating the mixer.
- 4 The mixers are designed to run against a designed specific gravity. **DO NOT RUN THE MIXER DRY.** Always test run in fluid less than or equal to designed specific gravity and viscosity unless otherwise stated.
- 5 When starting the mixer, make sure that the impeller is not buried in solids.
- 6 When making field changes of motor horsepower, speed, shaft length, impeller diameter, width, etc., consult with Cleveland Mixer.

Before beginning work on any installation, make sure you have all required parts. Keep all parts for installation together at all times. When Installing mechanical seals, please refer to the seal the manual supplied with your mixer.

MIXER ASSEMBLY

There are three styles of agitators addressed in this manual; Open Tank, Closed Tank and Sealed Tank.

Open tank models are typically mounted to a pair of beams or bridge work that traverse the tank. This superstructure can be either independent from the vessel or an integral part of the tank itself.

Closed or sealed tank units are typically mounted on ASA schedule nozzles and incorporate some style of sealing mechanism to contain pressure or rogue emissions.

In either case, it is critical that the mounting has a solid foundation which can withstand the various forces produced by the mixer. Excess vibration and movement can damage the mixer and the tank.

The mixer should be mounted to sit level - 90° for vertical units.

We suggest laser aligning the shaft from the hollow output of the reducer to the bottom of the tank. Shaft alignment will help to ensure the shaft will run true. You do not want the shaft sitting on even the slightest angle. An angled or misaligned shaft can cause excess vibration and speed wobble which can damage the mixer and/or tank.

Be sure that the turbine blades can freely rotate a full 360°. Be sure that the blades will not come in contact with: baffles, dip tubes, tank walls, etc. Refer to approval drawings for clearance information.

As previously mentioned; to ensure a long service life and dependable performance, the mixer must be rigidly supported and the shaft accurately aligned. The shaft should not move more than 1/32" per foot of shaft due to deflection of the structure. It is important that the gear reducer sits level for its lubrication system to work properly. Be sure to take into account where the oil drain plug is before mounting. The following describes the minimum precautions required to accomplish this end.

Before installing, take into account that your mixer's gear reducer will require regular scheduled maintenance and oil changes. Do not install the mixer in an inaccessible area. Do not seal the mixer into an area that does not have enough room to drain and refill the oil.

Foundation

The responsibility for the design and construction of the foundation lies with the user. The foundation must be adequate to withstand normal operating loads along with startup loads and shock loads while maintaining alignment with attached system components under such loads.

Concrete Foundation

If a concrete foundation is used, steel mounting pads and bolts of sufficient size to distribute the loads into the concrete should be grouted into the foundation.

Steel Foundation

If a structural steel foundation is used, a base plate of suitable thickness should be used and should extend under the entire unit.

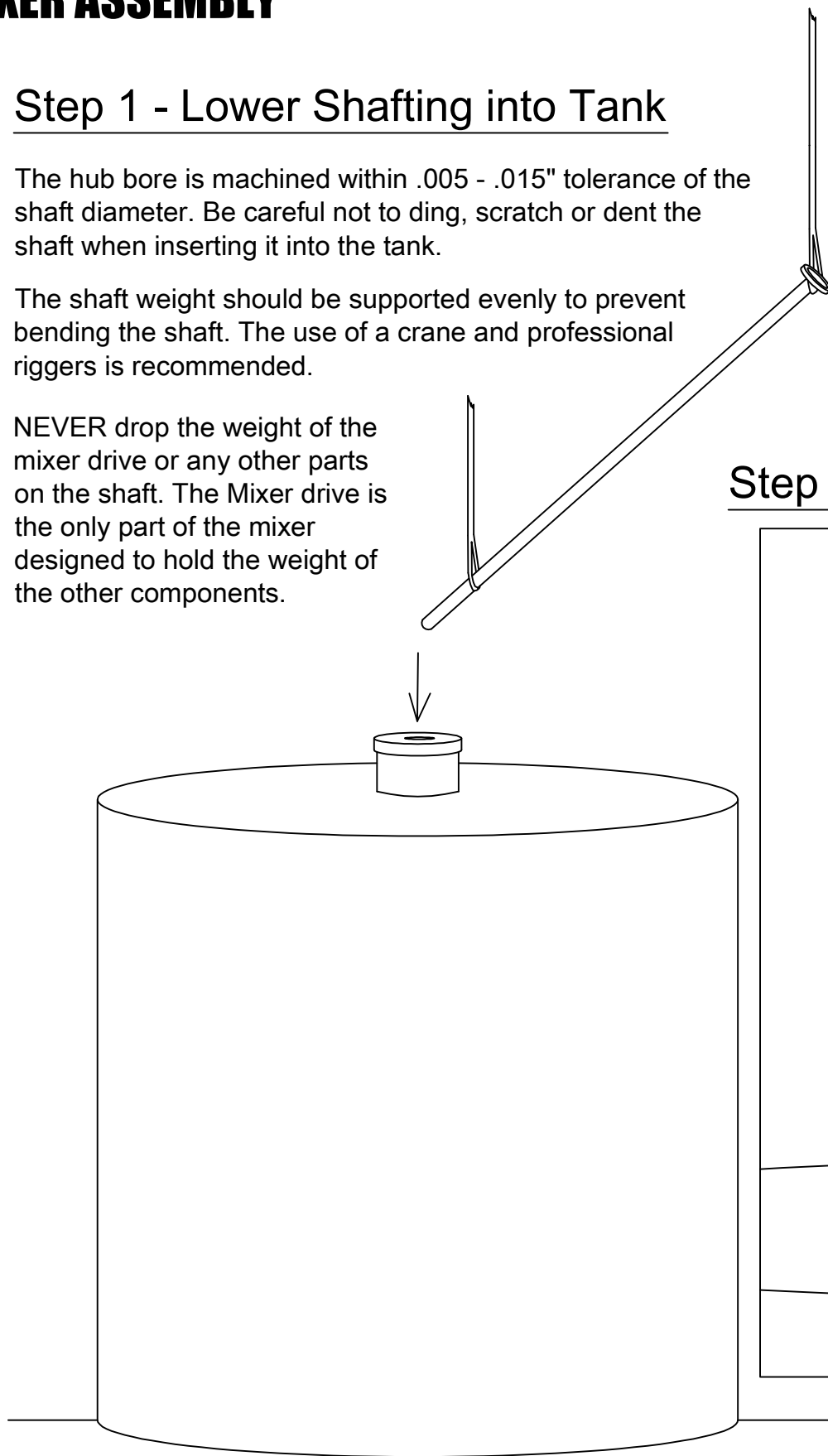
MIXER ASSEMBLY

Step 1 - Lower Shafting into Tank

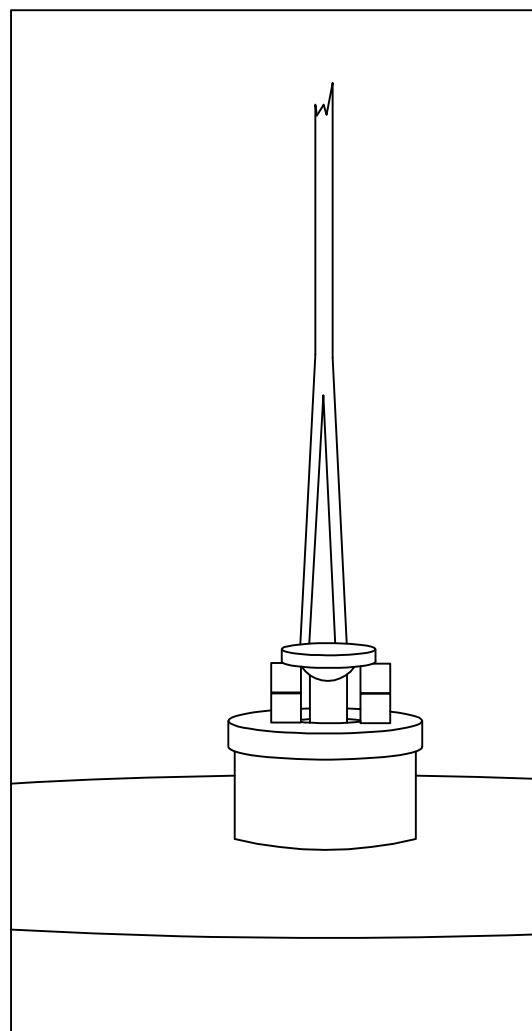
The hub bore is machined within .005 - .015" tolerance of the shaft diameter. Be careful not to ding, scratch or dent the shaft when inserting it into the tank.

The shaft weight should be supported evenly to prevent bending the shaft. The use of a crane and professional riggers is recommended.

NEVER drop the weight of the mixer drive or any other parts on the shaft. The Mixer drive is the only part of the mixer designed to hold the weight of the other components.



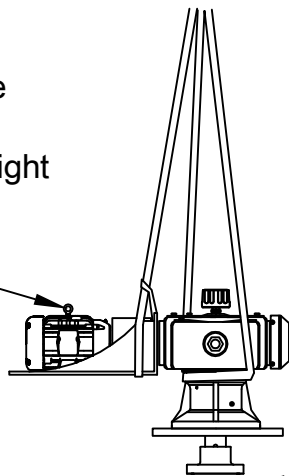
Step 2 - Brace Shafting



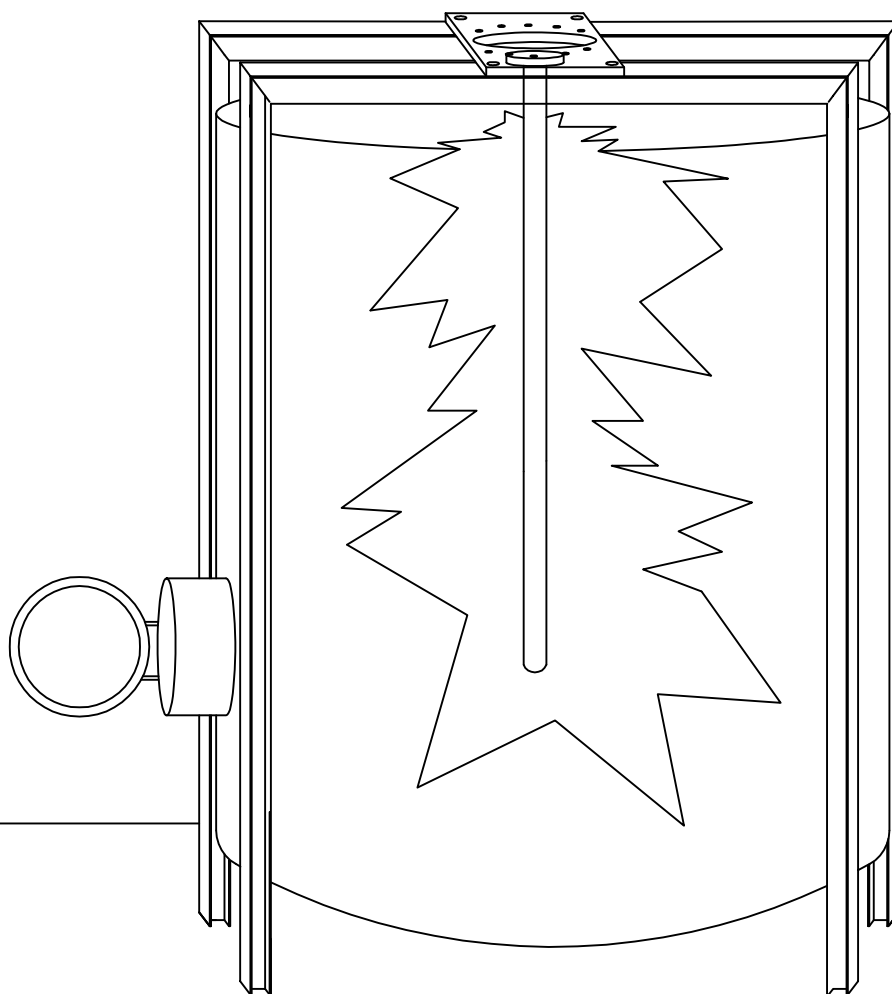
MIXER ASSEMBLY

Step 3 - Attach Drive to Tank Mount

Never support the mixer by the ring eyelet on the motor. It wasn't design to hold the weight of anything but the motor.



* Before removing the support strap, make sure to securely brace the shaft to the support beams on the top of the tank. Always bolt the output flanges together before removing the support straps from the mixer drive so that the shaft is held by the drive.

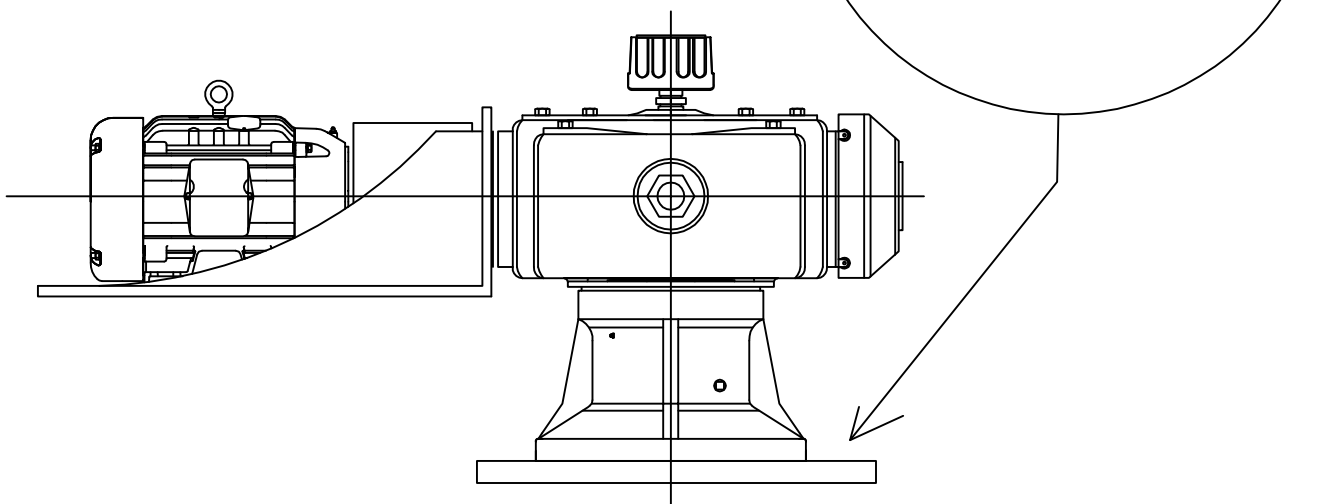


MIXER ASSEMBLY

Step 4 - Output Shaft Connection

When the drive is in place use a level to make sure that it is sitting evenly. You may need to use shims in order to get the drive level.

If your mixer has a steady bearing, Cleveland Mixer recommends using laser alignment of the output shaft to the center of the steady bearing. This will help the steady bearing operate properly while extending the life the shaft and steady bearing bushing.



REDUCER AND MOUNTING PLATE BOLTS

These bolts are also subject to high loads and should be properly torqued to prevent elongated bolts, excessive reducer vibrations, reduced mixer life and/or injury to plant personnel.

ALL FASTENERS SHOULD BE CLEAN, RUST FREE AND LIGHTLY OILED.

AXIAL RETENTION

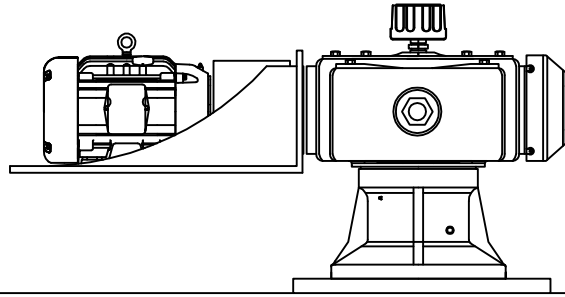
Each drive shaft must be retained in place relative to the gear reducer. Cleveland Mixer recommends the use of shaft shoulders, locking collars, snap rings or fixing elements to axially retain the shaft gear reducer position. Most units are designed and come equipped with these items.

SET SCREWS

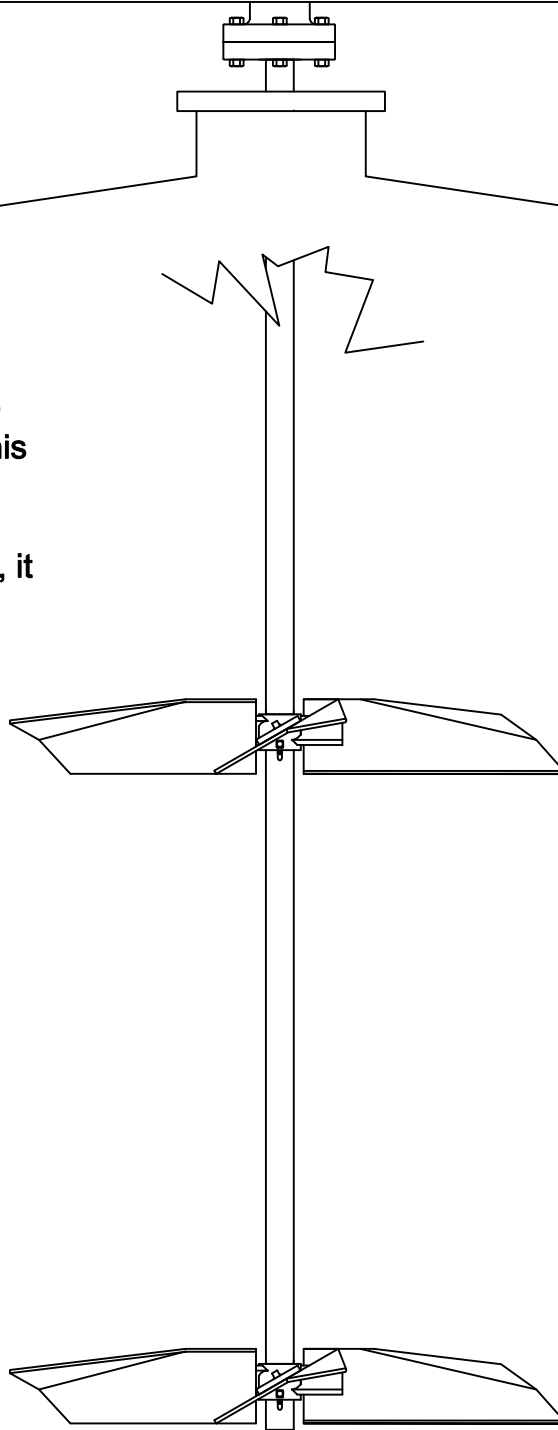
If set screws are used for axial retention, they should be tightened evenly. It is a good idea to use a drop of "Lock-Tite" or some form of thread locker on the set screws before installing them. This will help in the prevention of set screw back off. In some applications, flats or dimples may be provided on the drive shafts to give set screws something to grab onto.

MIXER ASSEMBLY

Step 5 - Impeller Assembly Connection



Once all of the mixer components are in place, make sure to torque all bolts to the values indicated in this manual. Thoroughly inspect the impellers before filling the tank, it will not be easy to make adjustments once the tank has liquid in it.

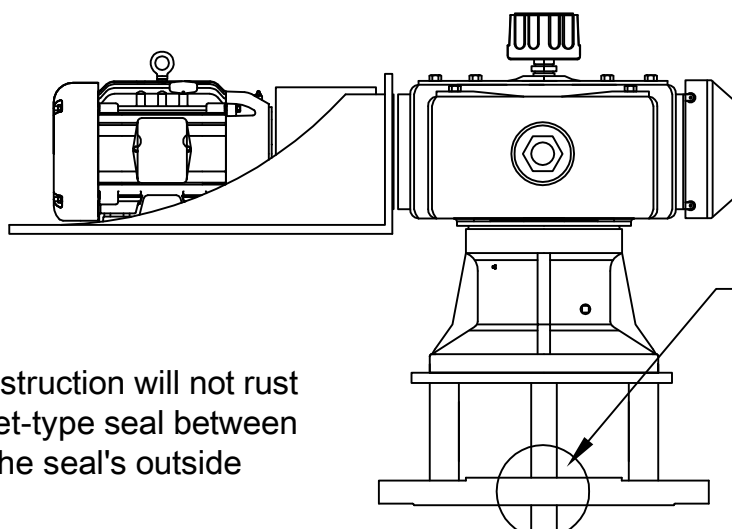


LIP SEAL/SPLIT LIP SEAL INFORMATION

The Clipper design features an integrally molded rubber fiber outer case and an elastomeric seal lip.

This unique, nonmetallic construction will not rust or corrode and forms a gasket-type seal between the equipment housing and the seal's outside diameter.

Clipper Split Seals are known for being the easiest split seal to install because they do not require a cover plate to keep them in the housing. The robust, composite OD provides the best retention of any split seal on the market. Replacing failed seals in the field saves on downtime and lost production. To change out the seals in the field, simply remove the coil tensioner, separate the split seal and peel the seal off from the shaft. Follow the same procedure in reverse to reinstall.



SEEN IN DETAIL IN FIGURE 1A

TOP VIEW OF SPLIT SEAL

CLOSED POSITION
FOR WHILE IN
OPERATION

COIL TENSIONER

OPEN POSITION;
REMOVAL, MAINT-
ENANCE

FIGURE 1A

NEMA FLANGE (MIXER)

PEDESTAL

MOUNTING FLANGE

SHAFT

SPLIT LIP SEAL (2)

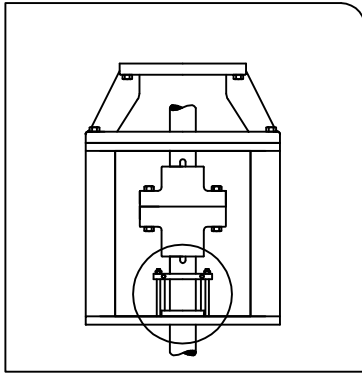
INSTALLED SPLIT SEAL

RUBBER LIP UP

INSTALL BACK TO BACK

RUBBER LIP DOWN

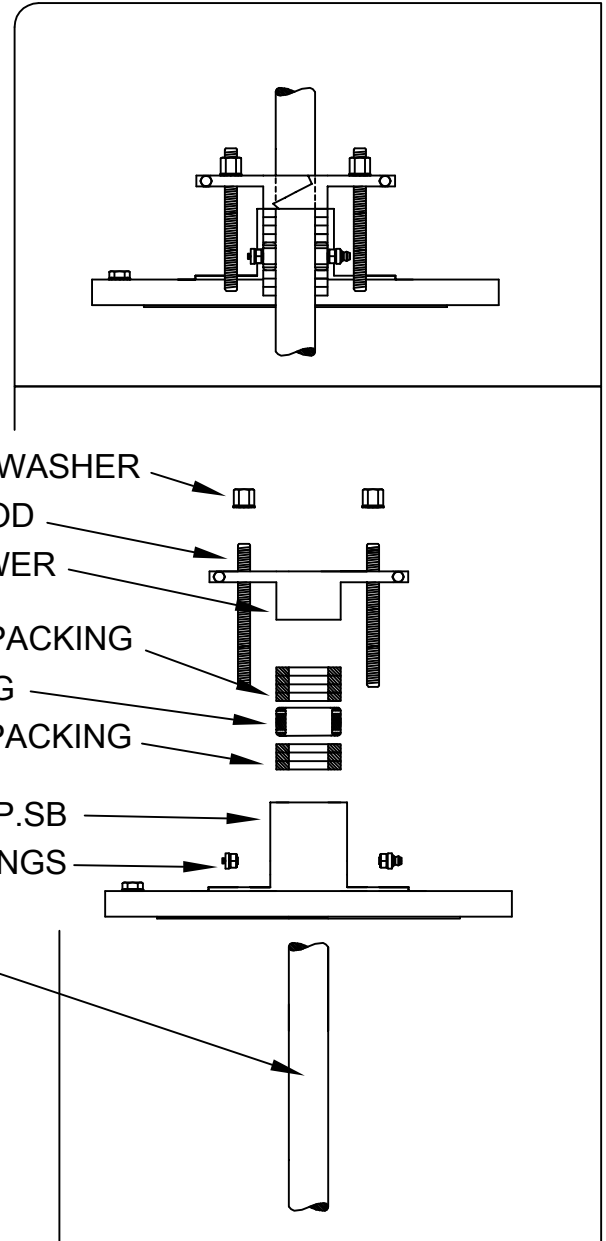
STUFFING BOX INFORMATION



LOW PRESSURE STUFFING BOX

Packing should always be inserted as individual rings, never wound in a spiral. Lubricate each ring generously with grease on the top and bottom surfaces. This will help minimize run-in time. Typically the set up for a high pressure stuffing box is 3 packing rings on the bottom then the lantern ring, 4 packing rings on top and then the split follower. For a low pressure stuffing box, the set up is typically two pieces of packing with the split follower on top.

It is important to keep the Stuffing Box properly lubricated in order for it to work properly. If the lantern ring and packing dry out, friction from the spinning shaft will burn up the packing and damage the shaft. The sealing properties of the packing will also not work if they are running dry. Lubricate the stuffing box through the grease fittings with a grease gun. Once the rings are properly greased, tighten down the follower finger tight only. Turn the mixer on and run at atmospheric pressure for 5-10 minutes. Then turn the mixer off and tighten down on the follower 1/2 turn of the follower bolts. The follower should always be pulled down uniformly and never more than 1/2 turn on the bolts at one time.



HIGH PRESSURE STUFFING BOX

With the mixer running, slowly pressurize the vessel to its most extreme operating pressure. At the same time, tighten the follower bolts slowly. Never tighten more than 1/2 turn at one time, and let the mixer run at least five minutes between each tightening.

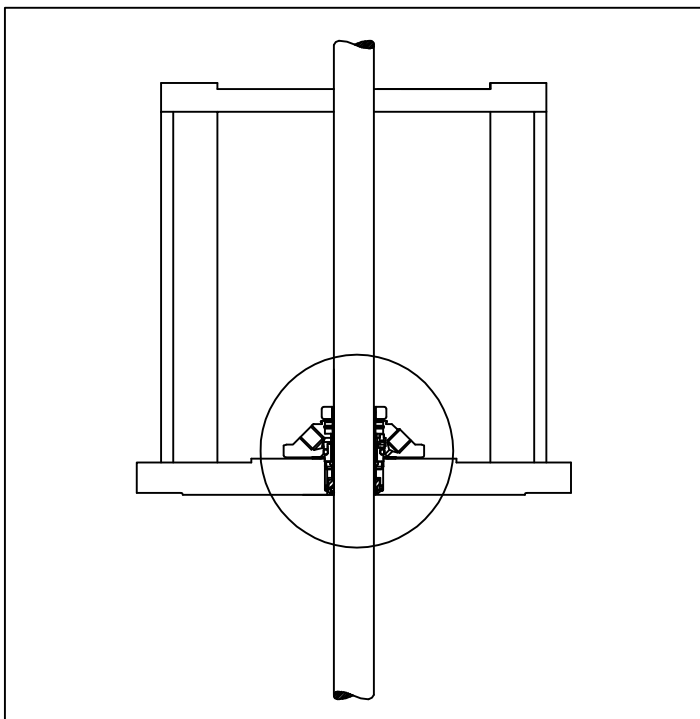
STUFFING BOX CONT./MECHANICAL SEAL INFORMATION

The total amount of tightening will vary, depending on the degree of tamping, the operating pressure and the density of the packing. Hard packing should seal in about one full turn of the bolts. Softer packing may take two or more turns. If the stuffing box is not sealed after one or two turns on the bolts, back off until they are loose and slowly add a pump of grease through the fitting. Draw down the bolts until they are again just finger tight. Allow the mixer to run for a few minutes, then resume the tightening process.

Do not tighten the packing beyond the point required to seal the box. Check the box two or three times during the first 24 hours of operation. If it starts to leak, an additional 1/4 turn should be sufficient to stop the leak in a minute or two.

After it has been installed and run in, the stuffing box should be periodically lubricated and inspected for leaks. Do not wait for a leak to start before lubricating the box. Longer packing life will be realized by preventing leaks through frequent lubrication. One pump of grease from a hand held grease gun for a 2" diameter or larger shaft; somewhat less than one pump for a smaller shaft. After some experience with the amount of grease required, the lubrication interval can be shortened or lengthened. The unit can be lubricated while the unit is running or off. It is a good practice to lubricate after a prolonged shutdown.

When a leak does occur, the first impulse should be to lubricate the packing, not tightening the follower. The packing does not provide the seal, the lubrication does. Make sure the lantern ring has adequate lubricant. Adding lubricant will often stop the leak within a minute or so. If the box is still leaking after five minutes, the follower should be evenly tightened a quarter turn until the leak stops.



MECHANICAL SEALS

In some applications, the use of a mechanical seal may be necessary. Refer to assembly drawing for seal mounting info and the seal manufacturer's manual for seal maintenance.

Split mechanical seals allow for maintenance or disassembly without draining the tank and removing the flange. Never remove a split mechanical seal w/o a maintenance manual specific to your model of seal. We recommend that you also have a rebuild kit or replacement seal handy.

B-LOC KEYLESS BUSHING

Keyless bushings are supplied lightly oiled and ready for installation (most open and closed tank, vertically mounted mixers will have their B-Loc couplings factory installed). When reinstalling a used coupling, make sure that all slits are aligned and that front and rear clamp collars are not reversed. When the bushings are assembled correctly, there are no holes or threads behind the taps in the clamp collar and no threads behind the taps in the center collar. The frictional torque capacity of these devices is based on a coefficient: friction - 0.12 for lightly oiled screws, taper and shaft & bore contact areas. NEVER use Molybdenum Disulfide (e.g. Molykote, Never-Seize or similar lubricants) in any keyless bushing installation.

STEPS TO INSTALL B-Loc KEYLESS BUSHING:

1. Make sure the locking screw, taper, shaft and bore contact areas are clean and lightly oiled and that all of the collar slits are aligned.
2. Loosen all locking screws by a minimum of four turns and transfer at least two screws to push-off threads in clamp collar to disengage this part from the center collar. Similarly, transfer at least two screws to push-off threads in center collar to disengage this part from the clamp collar.
3. Completed assembly can now be placed on the shaft and inserted into the hub bore by pushing against the face of the collar while ensuring that the collar is not engaged at the tapers during this phase.
4. After placement of the keyless bushing, relocate the locking screws used to separate the collars.
5. Hand tighten the connection and confirm that the clamp collar is parallel with the face if the part to be attached to the shaft and /or with the front facing edge of the center collar.
6. Use a torque wrench and set it approximately 5% higher than the specified torque value. Tighten the locking screws using only quarter turns for several passes until quarter turns can no longer be achieved.
7. Continue to apply over torque for one or two more passes. This is required to compensate for a system-related relaxation of locking screws since tightening of a given screw will always relax adjacent screws. Without over torqueing, an infinite number of passes would be needed to reach specified tightening torque.
8. Reset your torque wrench to the specified torque and check all the locking screws. No screw should be able to turn at this point. It is not necessary to recheck tightening torque after equipment has been in operation.

****Note** - When subjected to extreme corrosion, the slits in the clamp collars, as well as the center collars, should be sealed with a suitable caulking compound or equivalent. Likewise, push-off threads should also be protected from corrosion.

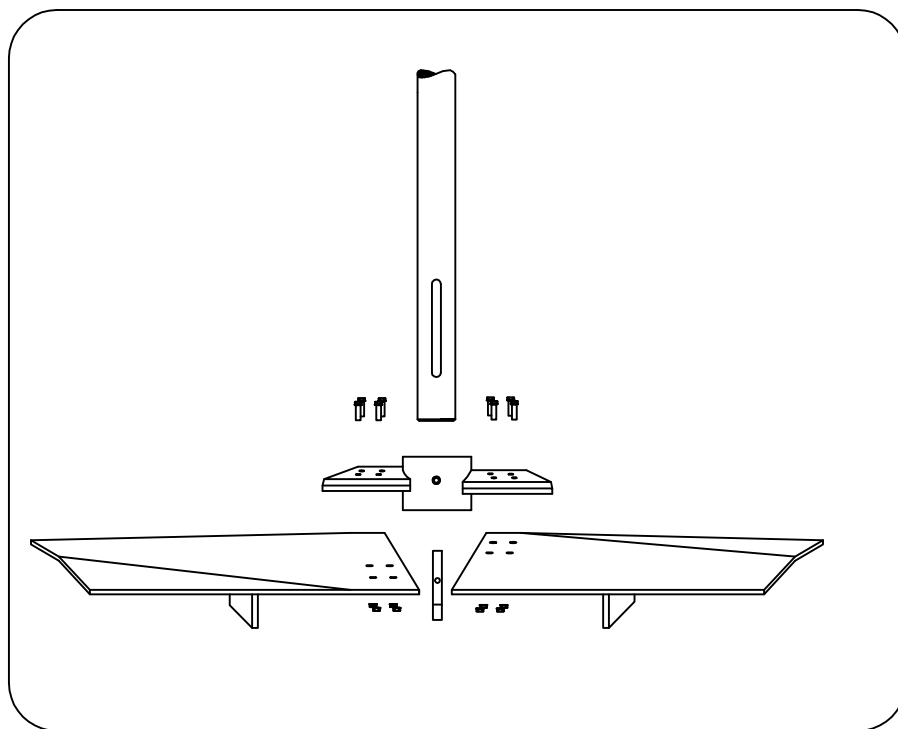
B-LOC KEYLESS BUSHING

STEPS TO REMOVE B-Loc KEYLESS BUSHING:

1. Check to ensure that axial movement of the clamp collars is not restricted. Check the condition of the push-off threads.
2. Remove all of the locking screws. Transfer the required number of screws into all push-off threads on the clamp collar.
3. Release the collar by progressively tightening down on all of the push-off screws. The screws may appear to be completely tight after just one pass without any noticeable separation of the clamp collars. Although it may seem like the screws cannot be tightened further, several more rounds of torqueing in either direction will increase the push-off force in the system and ultimately release part of the front collar.
4. Transfer the locking screws used for dismounting the clamp collar into all of the push-off threads in the center collar. Release the clamp collar by repeating the procedures described in step 3.

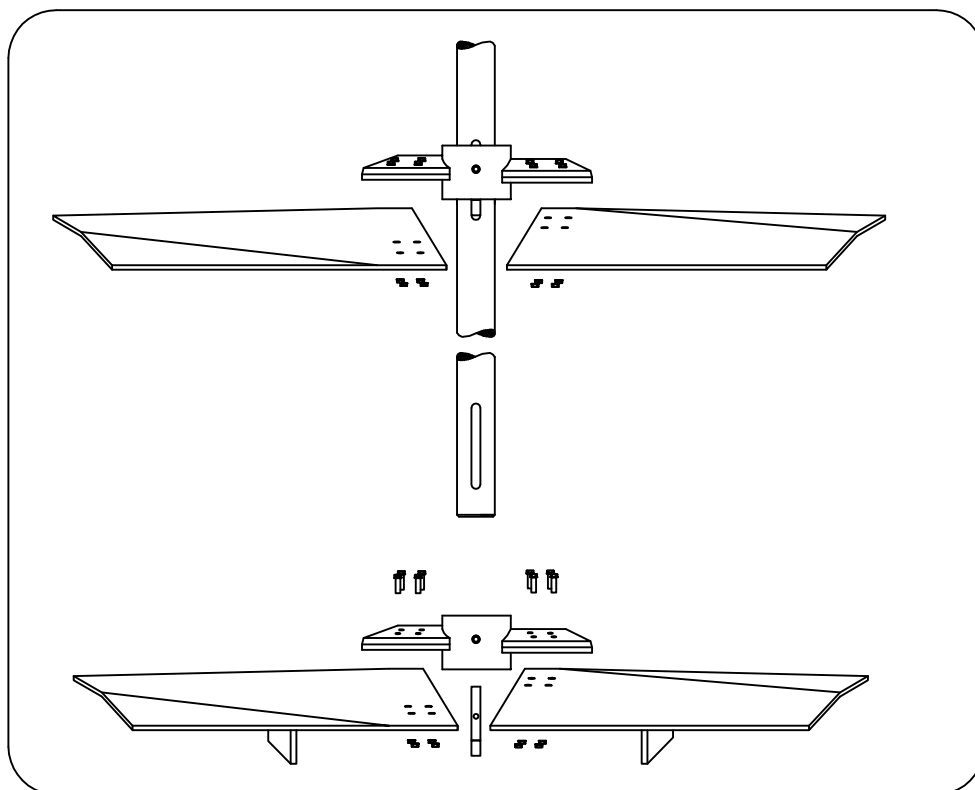
LOCKING SCREW SIZES AND TORQUE VALUES FOR KEYLESS BUSHING		
STANDARD	METRIC	TORQUE VALUE - FT LBS
1 to 1-7/16"	25 x 55 to 35 x 60	12
1-1/2 to 2-9/16"	40 x 75 to 65 x 95	30
2-5/8 to 3-5/8"	70 x 110 to 90 x 130	60
3-3/4 to 4-3/4"	100 x 145 to 120 x 165	105
4-15/16 to 6.00"	130 x 180 to 160 x 210	166
6-7/16 to 8.00"	170 x 225 to 260 x 325	257

IMPELLERS & SHAFTS



NOTE: IT IS VERY IMPORTANT THAT THE BOLTS BE TORQUED TO THE PROPER TORQUE VALUE INDICATED IN THIS MANUAL: PLEASE MAKE SURE THAT YOUR TORQUE WRENCHES HAVE BEEN PROPERLY CALIBRATED>Impellers and turbines can have varied number of blades. There should be a blade for every hub ear. Blades typically mount to the bottom of the ear. Check approval drawing or call factory for confirmation.

1. SINGLE IMPELLER INSTALLATION



NOTE: The extension shaft and other machined parts with close tolerances have been straightened and balanced to several thousandths of an inch. Please be careful when handling and installing this equipment.

NOTE: Keys have drill points on one side for set screw alignment.

To install any impeller, simply slide the impeller hub (top end of hub will be marked top) onto the shaft above the keyway. Slide the hub back down over the key until the hub is positioned with the set screw hole over the drill point on the key. Firmly tighten the hub set screw into the key.

2. MULTIPLE IMPELLER INSTALLATION

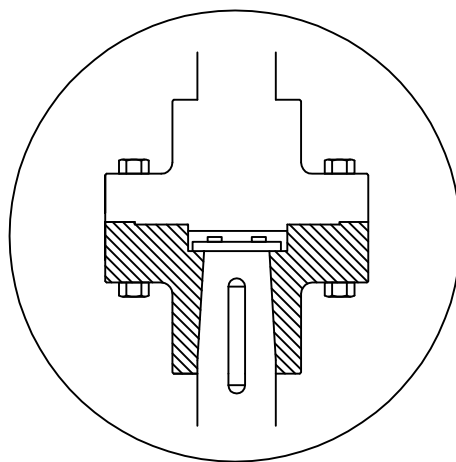
IMPELLERS & SHAFTS

Now that the impeller hub is on the shaft, firmly bolt the impeller hardware (blades, discs, stabilizers) into place. All in-tank fasteners should be rechecked for proper torque value after 1500 hours of operation. It is also recommended to check for proper torque value at scheduled shut down periods. All shaft and impeller bolts should be torqued to the values shown in the torque value table in this manual.

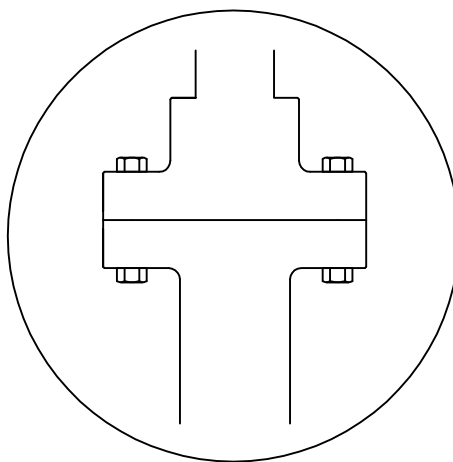
The upper shaft or shaft section, if it is a multi-piece shaft assembly, will have either a welded coupling, removable tapered bore coupling or B-Loc coupling that will mate with the low speed shaft on the reducer.

The welded coupling is used on upper shaft sections for open tank mixers that do not have any impellers mounted to it that would need to be removed. With a taper bore coupling, the upper shaft is assembled to the taper coupling and held in place by the internal cap plate bolted to the top of the shaft.

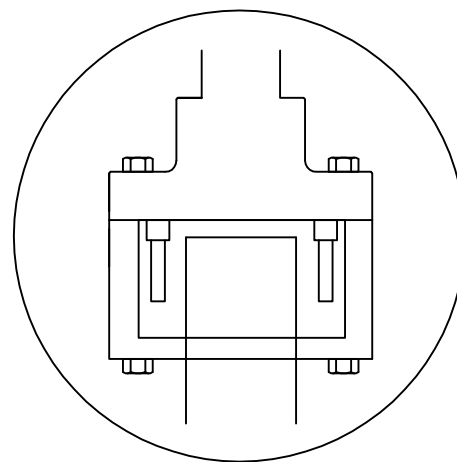
The rigid coupling is the welded flange type that requires no installation and would normally be found attached to the upper shaft assembly, either in or out of the process. There may be several of these connections between shaft sections in the assembly.



TAPER BORE COUPLING



RIGID COUPLING



B-Loc COUPLING

IMPELLER INSTALLATION

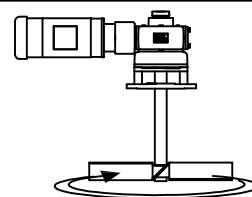
1. XTF-3R Impeller blades and hubs are shipped disassembled.
2. Slide the hub to the desired location over the key (the hub should be marked with "TOP" make sure that side is up). Tighten the set screw over the key. Impellers over 50 inches in diameter are provided with Gib keys. Lower the hub slowly until it rests on the Gib, then tighten the set screw.
3. Assemble the blades to the underside of the hub using four hex head cap screws and nuts per blade. Torque all bolts to the required specifications.
4. Retighten all bolted connections using proper torque settings before starting the mixer.

IMPELLERS & SHAFTS

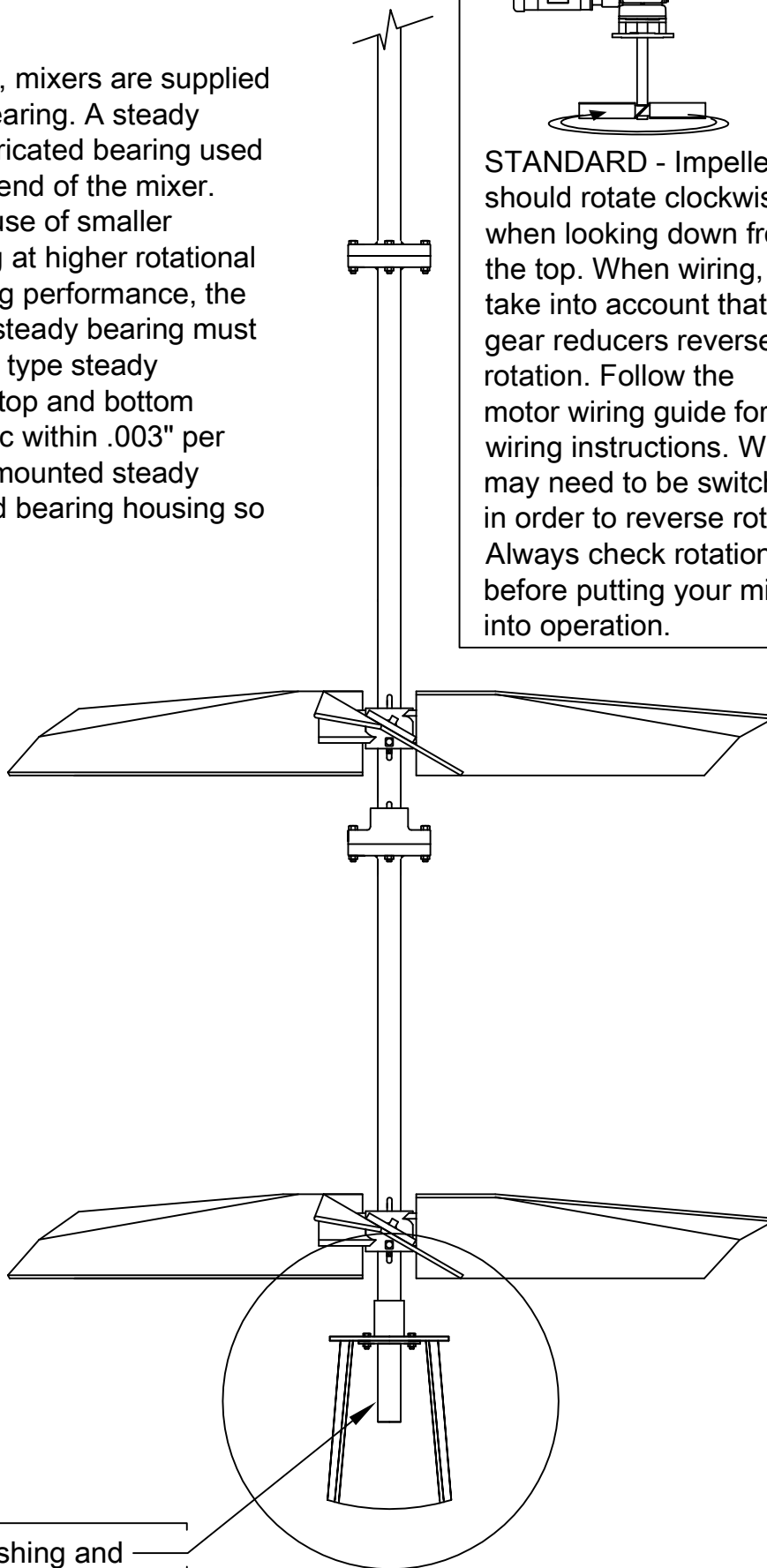
Steady Bearings: When specified, mixers are supplied with an optional in-tank steady bearing. A steady bearing is an in-tank, process lubricated bearing used to support and restrain the lower end of the mixer. Steady bearings permit the safe use of smaller diameter, longer shafts, operating at higher rotational speeds. For proper steady bearing performance, the mixer shaft must be straight and steady bearing must be centered on the shaft. For pad type steady bearings, be sure that the vessel top and bottom flanges are parallel and concentric within .003" per foot of separation. Shim bracket mounted steady bearings between the bracket and bearing housing so they stay centered on the shaft.

Even though a shaft may be straight and properly machined, it may appear to have excessive run-out toward the bottom. For longer shafts (20-30') 1/2 the shaft diameter may be acceptable. However, for shorter shafts, the run-out should not exceed 1".

For best results, the steady bearing should be laser aligned with the reducer quill and welded to tank. The steady bearing bushing should be inspected for wear during every shut down period. If the bushings are worn down to the metal of the bushing housing, they should be replaced. Call Cleveland Mixer with your mixer's serial number for replacement bushings.



STANDARD - Impellers should rotate clockwise when looking down from the top. When wiring, take into account that gear reducers reverse rotation. Follow the motor wiring guide for wiring instructions. Wires may need to be switched in order to reverse rotation. Always check rotation before putting your mixer into operation.



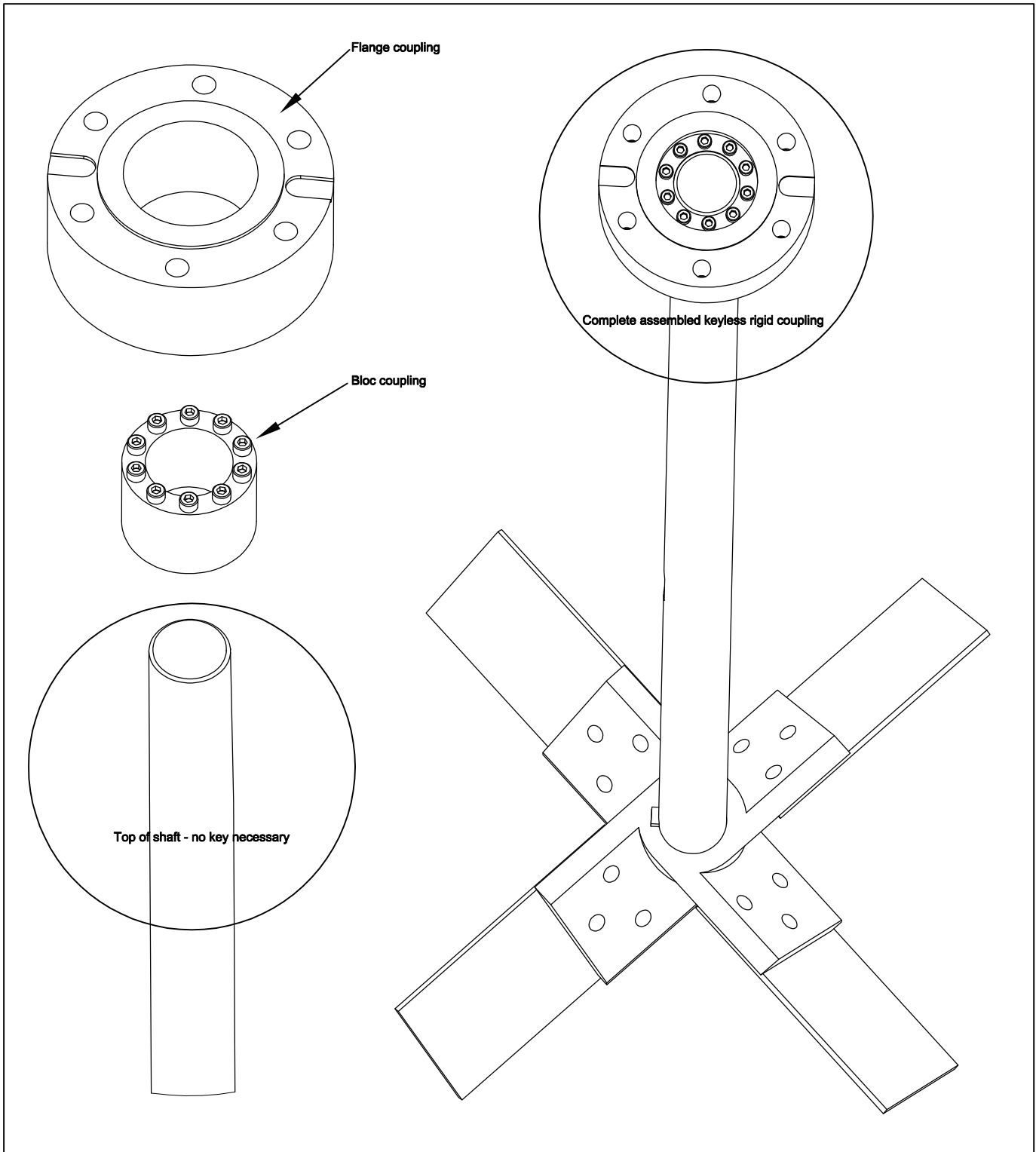
STEADY BEARING

STEADY BEARING - Bushing and bushing housing should be checked periodically for excessive wear. If your installment alignment is precise, you will experience less bushing wear.

IMPELLERS & SHAFTS

KEYLESS RIGID COUPLING

Keyless Rigid Couplings eliminate the need for shaft keys and keyways. Keyless rigid couplings will come with their own set of installation instructions specific to the size and style of coupling required for your mixer's design.



TORQUE VALUES FOR THRUST BOLTS

BOLT SIZE	ALL MATERIALS	
	FOOT POUNDS	NUMBER
1/2 - 13	50	68
5/8 - 11	90	122
3/4 - 10	160	217
7/8 - 9	140	190
1 - 8	220	298
1 - 1/8 - 7	300	407
1 - 1/4 - 7	420	570
1 - 3/8 - 6	556	754
1 - 1/2 - 6	740	1003
1 - 3/4 - 5	825	1118
2 - 4 - 1/2	1125	1525
2 - 1/4 - 4 - 1/2	1725	2338
2 - 1/2 - 4	2300	3117
* Lubricate bolt before installation. Torque each bolt to the appropriate value as shown above.		

NOTE: The bolt torques shown here will develop a fastener pre load of 80 % of the fastener's minimum yield.

COUPLING BOLTS - LOW SPEED SHAFT: At least Grade 5. The torque required may be found using the Grade 5 chart and reading across from the bolt diameter to be used. If stainless bolts are used, proceed with the proper stainless steel chart. Any looseness in these bolts causes the coupling to apply a shear load on the bolt and a high impact tensile load or shock load.

This shock load and shear load can cause the bolts to snap, the holes to elongate or the coupling to fail to keep the shaft running straight which can have numerous and permanent damaging effects on the mixer.

TORQUE VALUES FOR RIGID CONNECTIONS

	CARBON STEEL				Stainless Steel, Alloy 20, Monel, Hastelloy C	
BOLT SIZE	Grade 2		Grade 5			
	FT-LB	Nm	FT-LB	Nm	FOOT-LBS	NUMBER
3/8 - 16	15	20	23	30	15	21
1/2 - 13	38	51	56	77	37	50
9/16 - 12	50	68	83	112	54	72
5/8 - 11	68	92	113	152	74	101
3/4 - 10	120	163	200	271	131	178
7/8 - 9	105	143	296	401	212	287
1 - 8	165	224	443	601	318	432
1 - 1/8 - 7	225	305	596	808	450	610
1 - 1/4 - 7	315	428	840	1139	636	862
1 - 3/8 - 6	417	566	1003	1495	834	1130
1 - 1/2 - 6	555	752	1463	1983	1470	1500

NOTES:

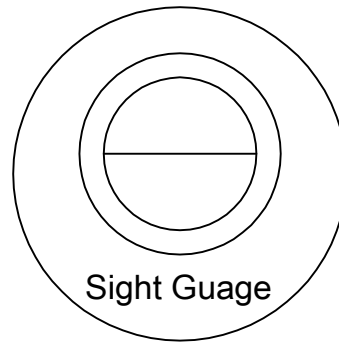
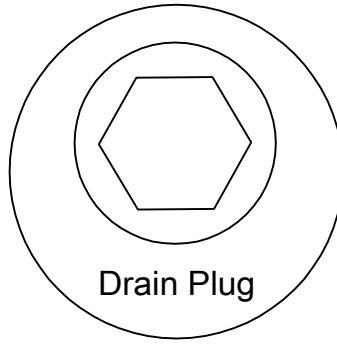
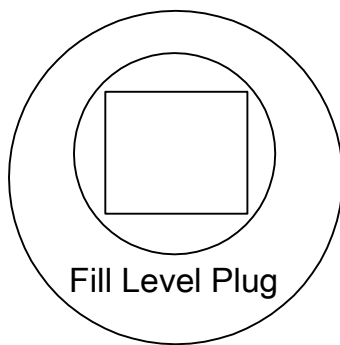
1. Tighten all fasteners to the values shown unless specifically instructed to do otherwise.
2. Lubricate all fasteners at assembly with grease, oil or anti-seize material.
3. If fasteners cannot be lubricated, multiply table values by 1.33

LUBRICATION & PLUGS

****IMPORTANT** - AL style reducers are shipped without oil. **ADD OIL BEFORE STARTING**
Use an oil grade and viscosity in accordance with AGMA standards. Cleveland Mixer recommends Mobil Lubricants. Use the sight gauge or oil plug to fill the gear case to the proper level. Please refer to pages 21-22 in this manual for additional lubrication information.

FILL LEVEL & DRAIN PLUGS

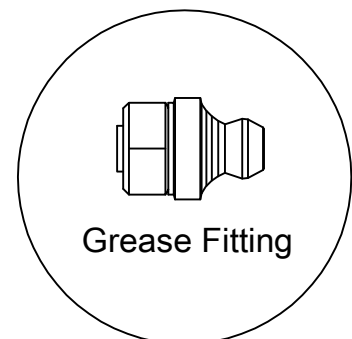
The drain plugs are socket head cap screws. They will be located at the lowest part of the gearbox for ease of draining.



GREASE FITTINGS

Add grease to high speed and slow speed bearings through grease fittings. AL reducers will come with grease fittings pre-installed in the appropriate locations. Bearing greases must be compatible with the type of gear lubricant being used (i.e. mineral, synthetic, food grade, etc.).

For mineral oils, use a synthetic bearing grease such as Mobil Synthetic Universal grease, Mobilith SHC 100 or suitable equivalent. Add grease as needed to keep bearings properly lubricated. Do not over pump grease into the grease fittings.



INSTALLATION

Proper installation of your worm gear speed reducer is essential for efficient, economical operation and a long operating life. The unit is built for proper operation in the mounting position ordered. Tilted or different mounting positions may require factory installed lubrication provisions.

Proper lubrication is crucial to obtaining the highest possible performance and efficiency. All "A" series mixer drives are shipped from the factory WITHOUT oil. Due to the nature of the worm gear's sliding and rolling actions, the lubricants listed on the next page must be used.

OIL CHANGES

Check the oil level while the unit is not in operation. Add oil when the oil level has gone below the fill line **Make sure to never mix oils. Drain and flush the gear housing after the first 150 hours of operation.

The regular maintenance schedule should be as follows:

Drain the oil and flush after every 6 months of normal service (8 hours of operation per day - 7 days per week, normal operating temperature).

Drain the oil and flush after every 3 months of heavy service (24 hours - 7 days per week) or (8 hours per day - 7 days per week in extreme temperatures or extreme environments).

GREASE LUBRICATED BEARINGS

All input and output bearings used in Cleveland's "A" series mixers are factory packed with NLGI grade 2 grease. This grease is mineral based with lithium base thickener. Repack the bearings using the same grade of grease during all normal oil change intervals.

Lubricants that should NEVER be used in the oil well of the reducer:

1. Motor Oil
2. Automotive Gear Oil
3. Grease
4. EP Oils

LUBRICATION INFO

CLEVELAND APPROVED LUBRICANTS

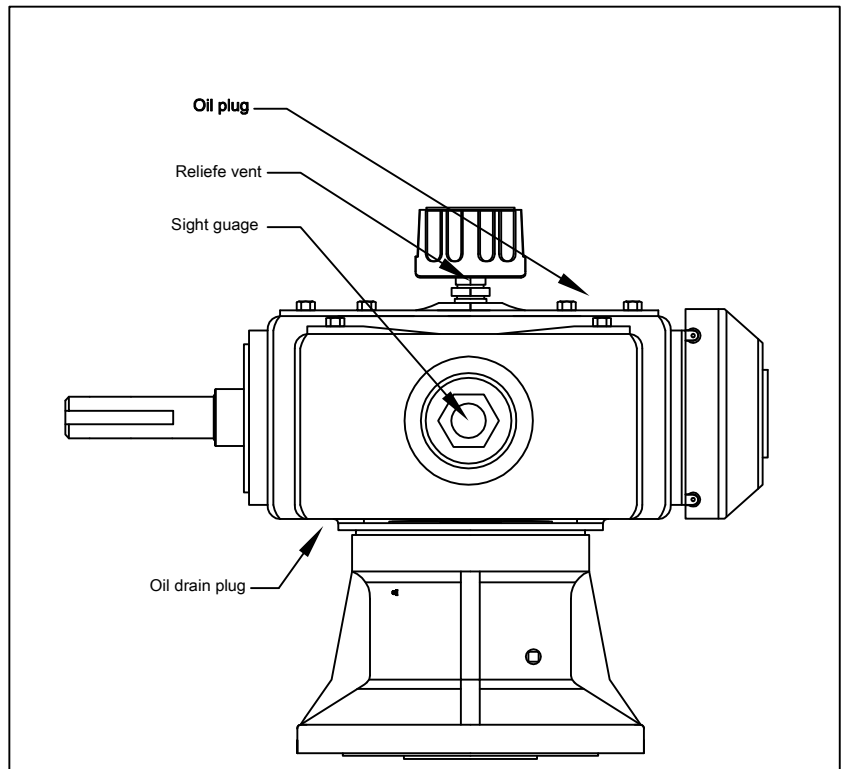
MANUFACTURER	COMPOUNDED STEAM CYLINDER OIL	
	AGMA #7C	AGMA #8C
AMOCO CHEMICAL CORP.	AMOCO CYLINDER OIL NO. 460	AMOCO CYLINDER OIL NO. 680
ASHLAND OIL INC.	LIGHT CYLINDER	NO PRODUCT
ATLANTIC RICHFIELD CO.	NO PRODUCT	MODOC 175
BP	ENERGOL DCC 460	ENERGOL DCC 680
CHEVRON	CHEVRON CYL. OIL ISO 460	CHEVRON CYL. OIL ISO 680
CITGO	CITGO CYL. OIL 400-5	CITGO CYL. OIL 680-7
CONTINENTAL OIL CO.	INCA OIL 460	INCA OIL 680
EXXON	CYLESSTIC TK 460	CYLESSTIC TK 680
IMPERIAL OIL LTD.	CYLESO TK 460	CYLESO TK 680
KEystone	NO PRODUCT	KEYGEAR K600
MOBIL (USA)	600W CYLINDER OIL	600W CYLINDER OIL
MOBIL (CANADA)	600W CYLINDER OIL	600W CYLINDER OIL
PHILLIPS PETROLEUM CO.	HECTOR 460S	HECTOR 630S
SHELL OIL CO.	VALVATA OIL J 460	VALVATA OIL J 680
SHELL (CANADA)	VALVATA OIL J 460	VALVATA OIL J 680
TEXACO	VANGUARD CYLINDER OIL 460	VANGUARD CYLINDER OIL 680
UNION OIL CO.	UNION STEAVAL B110	UNION STEAVAL B165
MANUFACTURER	AGMA 7 SYNTHETIC	AGMA 8 SYNTHETIC
Klubersynth	Gem 4-460N	Gem 4-680N
Mobil Oil Corp.	SHC 634	SHC 636
Petro Canada	Syndro SHB 460	No Product
INCLUDES BRANDS ALREADY TESTED FOR EFFECTIVENESS AND APPROVED BY MFG.		
BEARING GREASE		
SHELL	SHELL DURINA SD2	NLGI Grade 2

LUBRICATION INFO - AL SERIES

GEAR CASE OIL

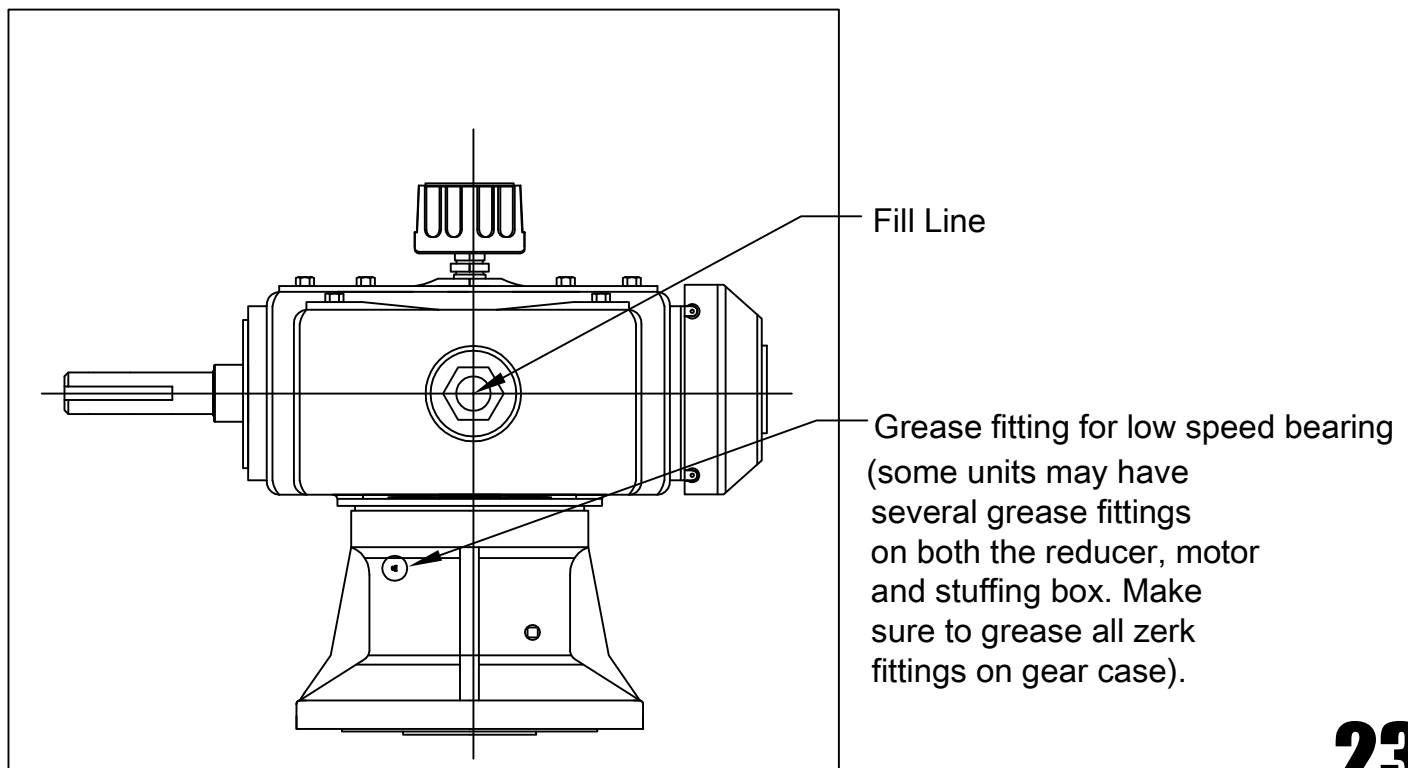
All units are shipped from the factory WITHOUT oil. Units should be filled to the level plug.

Check oil level periodically when the unit is not operating. Add oil if necessary. Drain and flush housing after first 150 hours of operation. Drain the oil and flush after every 6 months of normal service or after every 3 months of heavy or severe service (around the clock operation or harsh operating environment). If ambient temps are below 15° F, a winter lubricant must be added since AGMA 7 & 8 oils will solidify. Suppliers of industrial lubricants should be contacted to supply suitable lubricants to meet AGMA specifications (please see page 22 for oil recommendations).



BEARING GREASE

Grease Lubricated Bearings - The low speed shaft bearings are provided with grease fittings. These bearings are packed at assembly with lithium based grease NLGI grade 2 with EP additives. (Cleveland recommends Mobil or Shell - Durina SD2 / NLGI grade 2 bearing grease).



LUBRICATION INFO - ALD SERIES

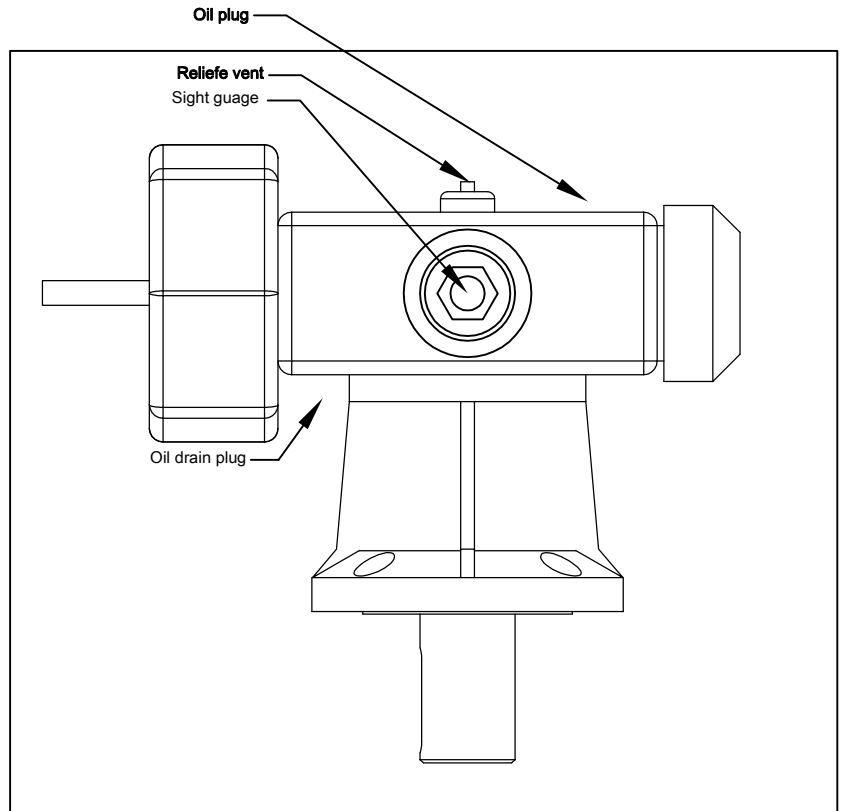
GEAR CASE OIL

All units are shipped from the factory WITHOUT oil. Units should be filled to the level plug.

Check oil level periodically when the unit is not operating. Add oil if necessary. Drain and flush housing after first 150 hours of operation.

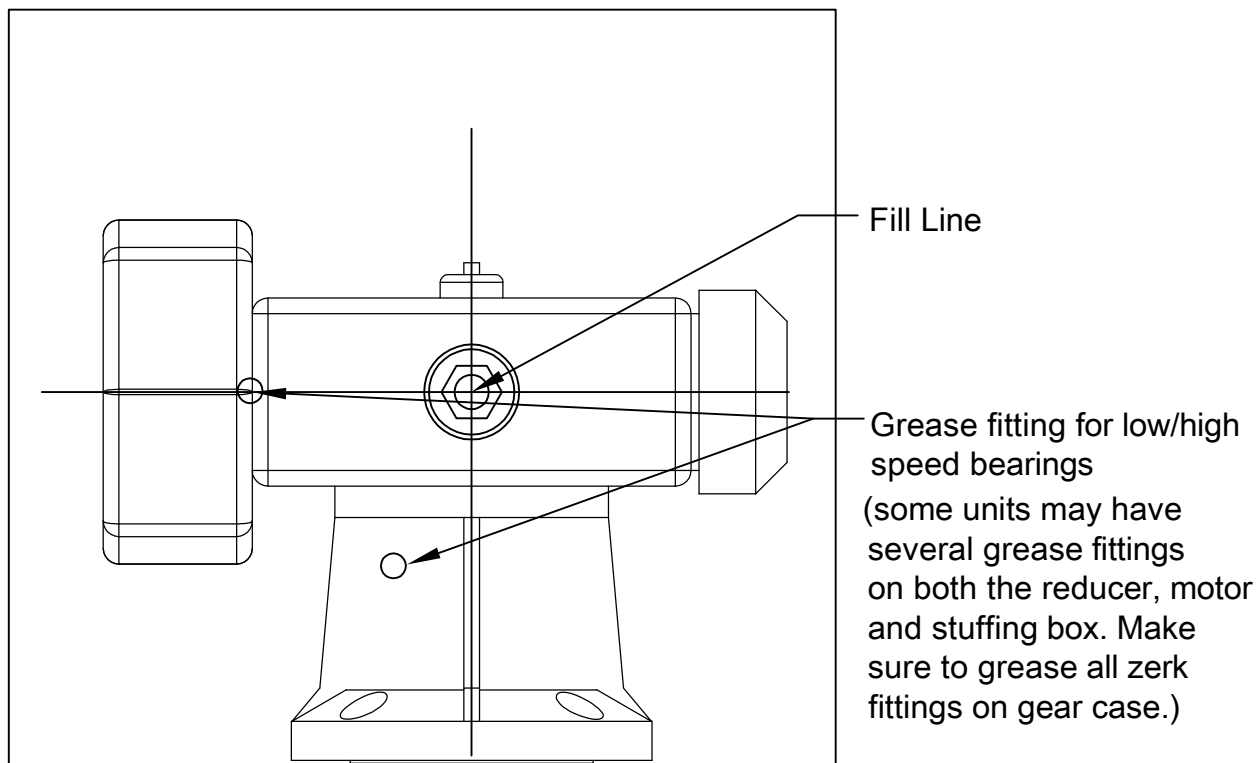
Drain the oil and flush after every 6 months of normal service or after every 3 months of heavy or severe service (around the clock operation or harsh operating environment). If ambient temps are below 15° F, a winter lubricant must be added since AGMA 7 & 8 oils will solidify.

Suppliers of industrial lubricants should be contacted to supply suitable lubricants to meet AGMA specifications (please see page 22 for oil recommendations)



BEARING GREASE

Grease Lubricated Bearings - The low speed shaft bearings are provided with grease fittings. These bearings are packed at assembly with a lithium base grease NLGI grade 2 with EP additives. (Cleveland recommends Mobil or Shell - Durina SD2 / NLGI grade 2 bearing grease)

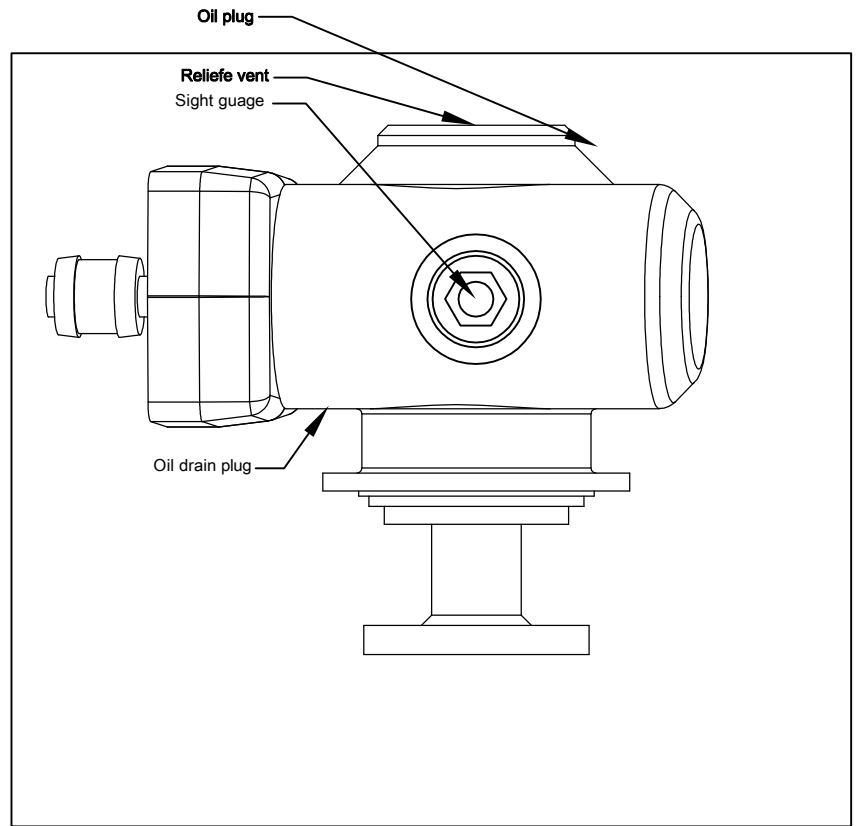


LUBRICATION INFO - AD SERIES

GEAR CASE OIL

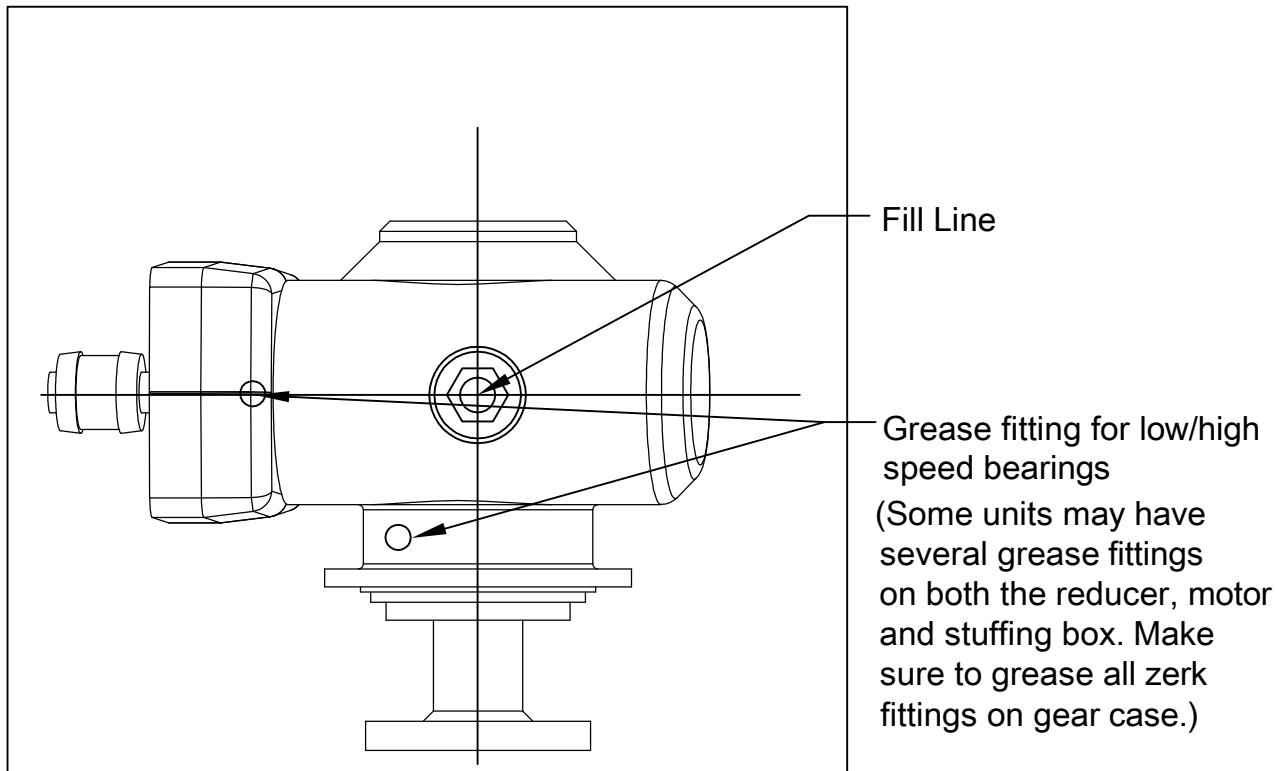
All units are shipped from the factory WITHOUT oil. Units should be filled to the level plug.

Check oil level periodically when the unit is not operating. Add oil if necessary. Drain and flush housing after first 150 hours of operation. Drain the oil and flush after every 6 months of normal service or after every 3 months of heavy or severe service (around the clock operation or harsh operating environment). If ambient temps are below 15° F, a winter lubricant must be added since AGMA 7 & 8 oils will solidify. Suppliers of industrial lubricants should be contacted to supply suitable lubricants to meet AGMA specifications (please see page 22 for oil recommendations)

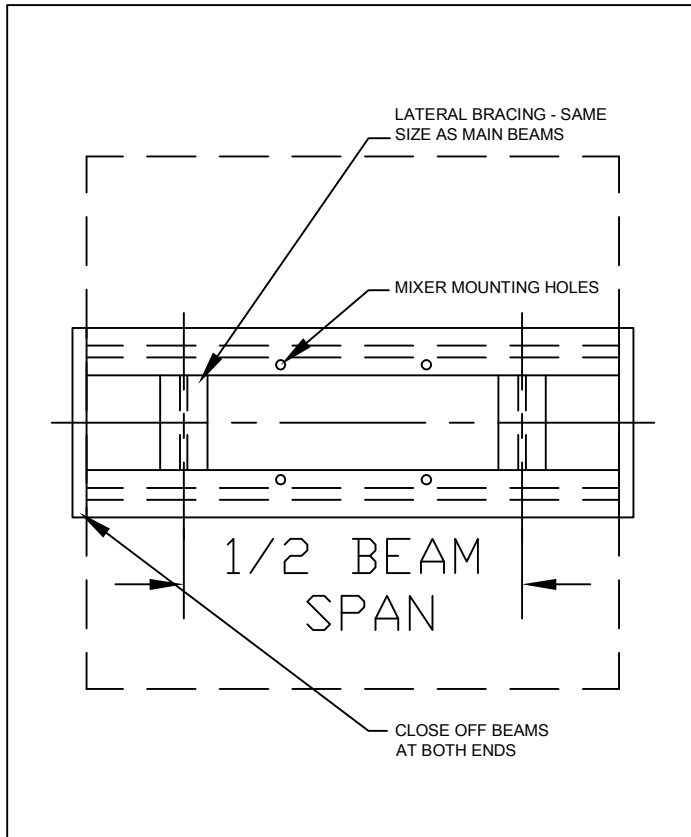


BEARING GREASE

Grease Lubricated Bearings - The low speed shaft bearings are provided with grease fittings. These bearings are packed at assembly with a lithium base grease NLGI grade 2 with EP additives. (Cleveland recommends Mobil or Shell - Durina SD2 / NLGI grade 2 bearing grease)



SUPPORT BEAM RECOMMENDATIONS

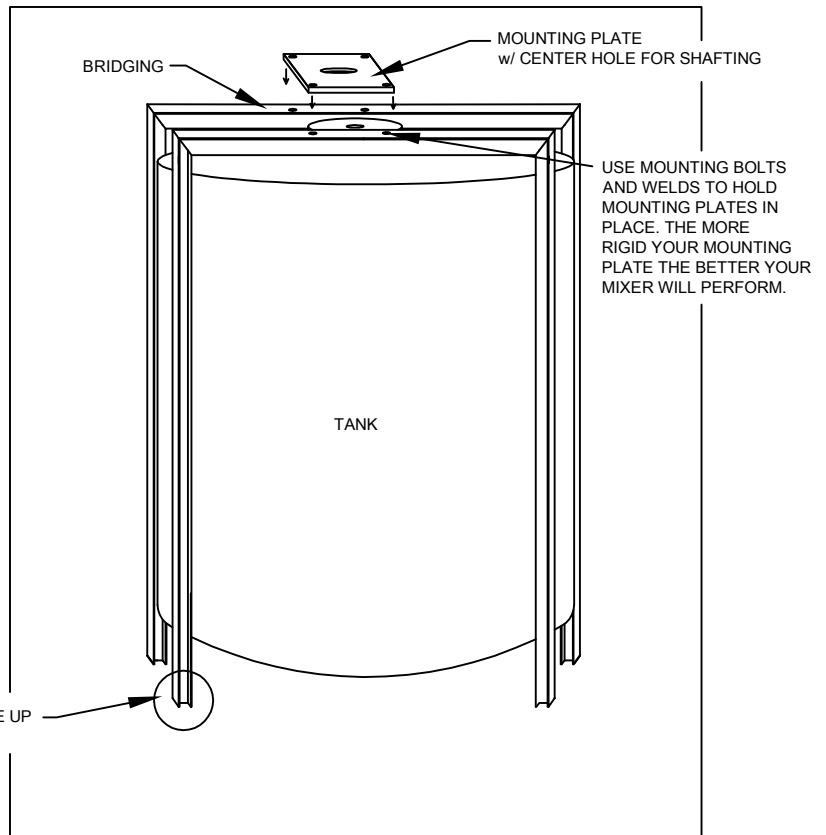


1. If the design load exceeds the actual loads by a factor consistent with construction codes. If the recommended beams are to carry loads in addition to the mixer, larger beams may be required.

2. Cleveland Mixer warranty applies only to items supplied by Cleveland Mixer. Cleveland Mixer does not assume any responsibility or liability for the design or construction of the tank, mounting structure, electrical system or any other equipment not manufactured by Cleveland Mixer.

Support beams should be bridged over the tank and be supported by a solid surface. Tanks often vibrate. If the support bridging is only supported by the tank, the mixer will not have the rigidity it needs to operate.

Even if your tank is made from steel, when thousands of gallons start moving around, the tank can vibrate, pulsate, sway, etcetera. Those events can create forces and movement that the shaft and impellers were not designed to handle.



FLANGE CONNECTIONS

STANDARD 150 LB. FLANGE

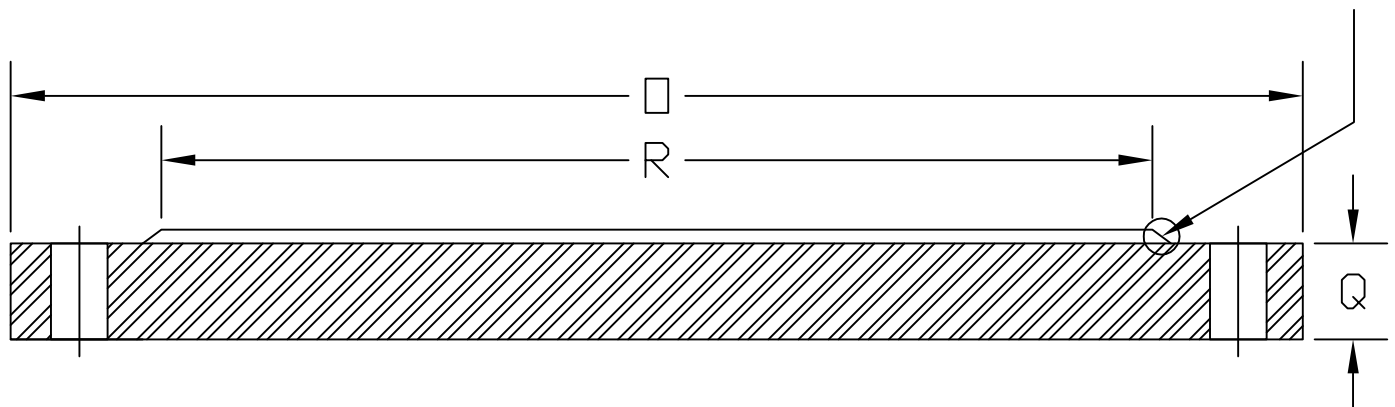
NOMINAL PIPE SIZE	OUTSIDE DIAMETER OF FLANGE -O-	THICKNESS OF FLANGE -Q-	DIAMETER OF RAISED FACE -R-	NUMBER OF BOLT HOLES	DIAMETER OF BOLTS	DIAMETER OF BOLT CIRCLE	APPROX. WEIGHT IN LBS
4	9.00"	15/16"	6-3/16"	8	5/8"	7-1/2"	17#
5	10.00"	15/16"	7-5/16"	8	3/4"	8 -1/2"	20#
6	11.00"	1.00"	8-5"	8	3/4"	9 -1/2"	27#
8	13.50"	1-1/8"	10-5/8"	8	3/4"	11-3/4"	47#
10	16.00"	1-3/16"	12-3/4"	12	7/8"	14-1/4"	67#
12	19.00"	1-1/4"	15-00"	12	7/8"	17.00"	102#

*150 LB. Blind Flanges - All dimensions are given in inches. Flanges are furnished faced, drilled and spot faced or back faced.

Bolt holes are 1/8" larger than bolt diameter.

The 1/16" raised face is included in dimension "Q"

1/16" RAISED FACE



TROUBLE SHOOTING

PROBLEM WITH THE REDUCER		POSSIBLE CAUSES	SUGGESTED REMEDY
RUNS HOT	Overloading	Load exceeds the capacity of the reducer	Check rated capacity of reducer, replace with unit of sufficient capacity or reduce load
		Insufficient Lubrication	Check lubrication level and adjust down to recommended level
	Improper Lubrication	Excessive Lubrication	Check lubrication level and adjust down to recommended level
		Wrong Lubrication	Flush out and refill with correct lubricant as recommended
RUNS NOISY	Loose Foundation Bolts	Weak Mounting Structure	Inspect mounting of reducer. Tighten loose bolts. Reinforce mounting structure
		Loose hold down bolts	Tighten bolts
	Bearing Failure	May be due to lack of lubricant	Replace bearing. Clean and flush reducer and fill with recommended lubricant.
		Overload	Check rated capacity of reducer
	Insufficient Lubrication	Level of lubricant inside the reducer not properly maintained	Check lubrication level and adjust down to recommended level
OUTPUT SHAFT DOESN'T TURN	Internal Parts are Broken	Overloading of a reducer can cause damage	Replace broken parts. Check rated capacity of reducer.
		Key missing or sheared off in input shaft	Replace key
		Coupling loose or disconnected	Properly align reducer and coupling. Tighten coupling.
OIL LEAKAGE	Worn Seals	Caused by dirt or grit entering seal	Replace seals.
		Overfilled reducer	Check lubricant level and adjust to recommended level.
		Improper mounting position, such wall or ceiling mount horizontal reducer	Clean or replace, being sure to prevent any dirt from falling into the reducer.
			Check mounting position to approval drawings

DEACTIVATION & STORAGE

DEACTIVATION

SHORT TERM SHUTDOWN - Units may be deactivated and left offline for up to four months without special precautions.

LONG TERM SHUTDOWN - If the unit is to be deactivated or stored for more than four months after any period of operation:

1. Indoor dry storage is recommended for all inactive units. Deactivated units stored outdoors should be protected from the weather. It is most important to keep the unit dry and in a temperature controlled area.
2. Drain the oil from the unit and spray the inside of the gear case with a long term storage lubricant such as "Motorstor" or a suitable vapor phase rust inhibitor at the rate of one ounce per cubic foot. Make sure to mark the gearbox appropriately so that the storage lubricant is drained and the gear case is refilled with the proper lubricant before restarting.
3. Mixer shafts should be removed and coated with Cosmoline or suitable preservative (even stainless steel shafts should be coated where they come into contact with steel or banding straps). Make sure the shafts are properly supported to prevent bending. It is good to rotate the shafts periodically to keep them from settling in one position which can cause them to bend. When storing carbon steel parts outdoors, apply suitable grease or rust preventative to all parts. Turbine parts should also be coated with preservative, especially the bore of the turbine hub.
4. Motors should be stored in a cool, dry environment. The motor shaft should be rotated once each month.
5. Inspect stored or inactive units at 90 day intervals. Re-spray with rust preventative or add rust inhibitor at least once every six months as required.

PREVENTATIVE MAINTENANCE

PREVENTATIVE MAINTENANCE CONTINUED

The first week after startup / restart: Check all external fasteners and plugs for proper torque.

Gears and internal bearings have been factory set and require no adjustments. Driven shaft bearings require no maintenance other than periodic regreasing.

NOTE: If the oil level has risen since the previous check, have the oil analyzed for water content. Moisture in the oil may indicate seal leakage or condensation. Drain the oil, correct the defect and refill the unit with fresh oil.

OPERATION & MAINTENANCE CHECKLIST

1. Operate the equipment as it was intended to be operated.
2. Do not overload
3. Run at correct speed
4. Maintain lubricant in good condition and at proper level.
5. Apply proper maintenance to attached equipment at prescribed intervals recommended by Cleveland Mixer.
6. Perform periodic maintenance of the gear drive as recommended by Cleveland Mixer.

STANDARD OIL - INDICATED ON THE SIDE OF THE REDUCER.

* DO NOT MIX OILS. ALWAYS DRAIN UNIT COMPLETELY BEFORE USING A NEW GRADE OR BRAND OF OIL. MIXING MINERAL OIL AND SYNTHETIC OIL IN THE SAME WELL MAY CAUSE PERMANENT DAMAGE TO GEAR REDUCER.

MOTOR INFO

Cleveland Mixer mixers are supplied with motors manufactured by nationally known sources. Under normal operating conditions, within specified temperatures, proper installation and maintenance, these motors will deliver their rated output.

If the mixer will be operating in a particularly harsh environment (e.g. extreme temperatures, high levels of dust, etc.) please contact Cleveland Mixer before operating your mixer. Standard motors are fan cooled which may not be the right motor for your application.

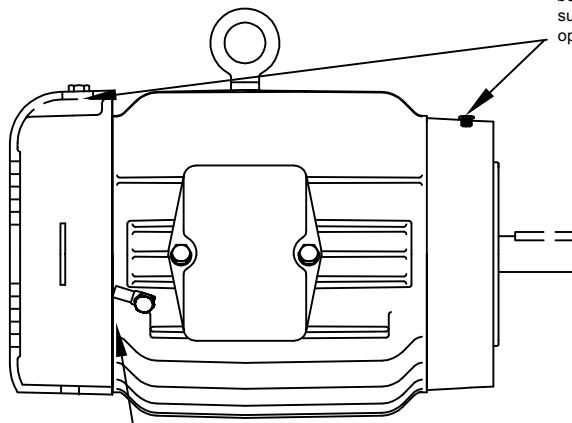
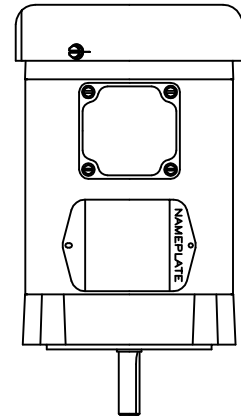
To get the best performance and a long service life from your electric motor, be sure there is plenty of air circulation and a minimum of obstructions. On fan cooled motors, be sure not to choke off the suction inlets. Also be sure to check the allowable temperature, amp draw, horsepower and voltage indicated on the motor plate.

Always consult Cleveland Mixer before making changes to your process. Your mixer was designed to run in a process. Changes to this process can be detrimental to the proper operation of your mixer.

To avoid damage to the motor during temporary overloads, jams, etc., be sure overload protection is provided. Starter overload heater elements can be sized from the full load current of the motor (as shown on the nameplate).

Before the electric motor is put into operation, check the gear drive nameplate to be sure the output shaft rotation is correct. Standard output rotation is clockwise (when looking down from the top).

To reverse the rotation of standard 3 phase electric motors, simply switch any two power leads. Check the manufacturers literature supplied with your mixer for more information.



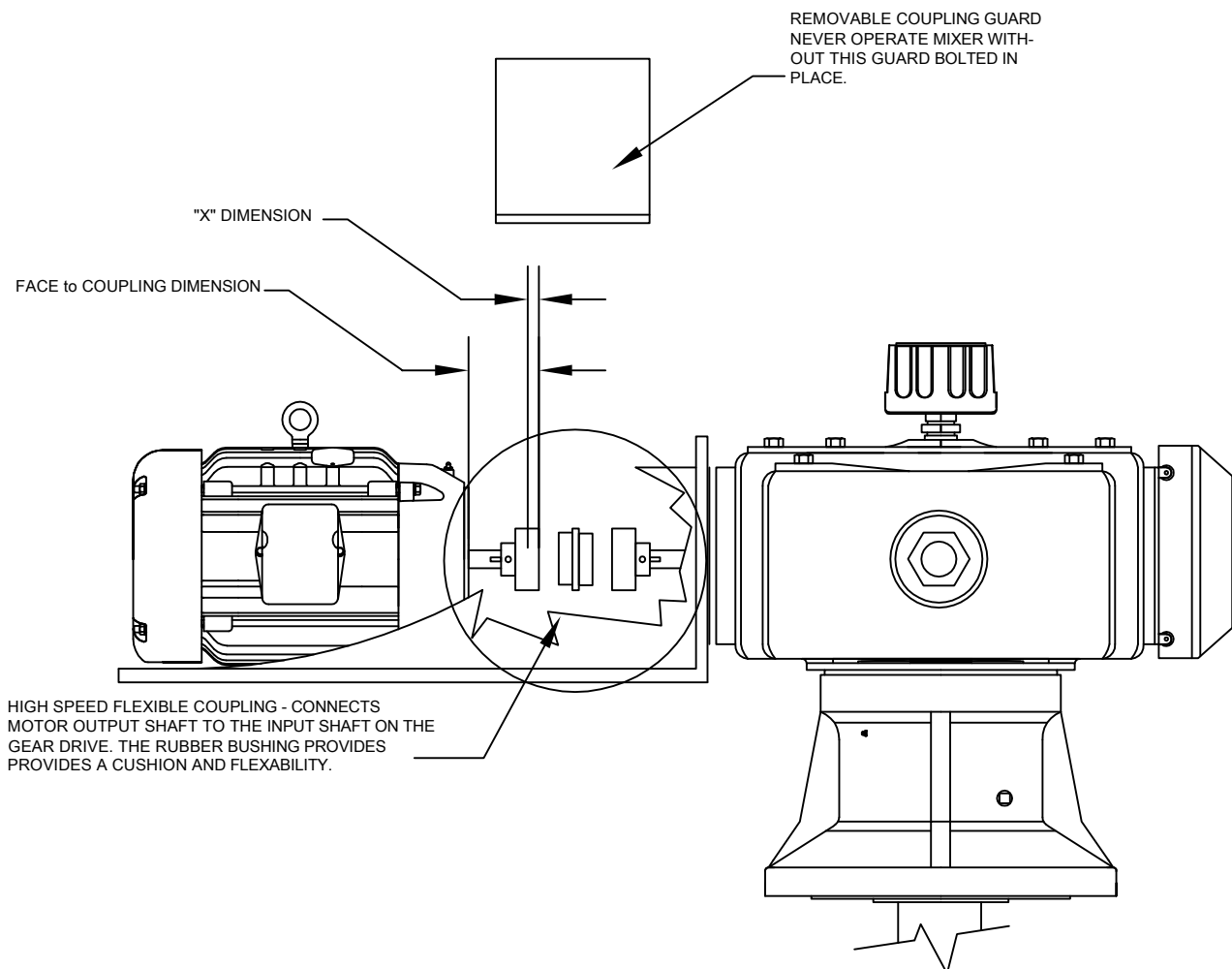
If your motor has grease fittings for the upper and lower bearings, please make sure to add grease to the bearings as suggested by the manufacturer. This will help to extend the operation life of the bearings.

TEFC motors (totally enclosed, fan cooled)
make sure to keep the suction inlets free and clear.

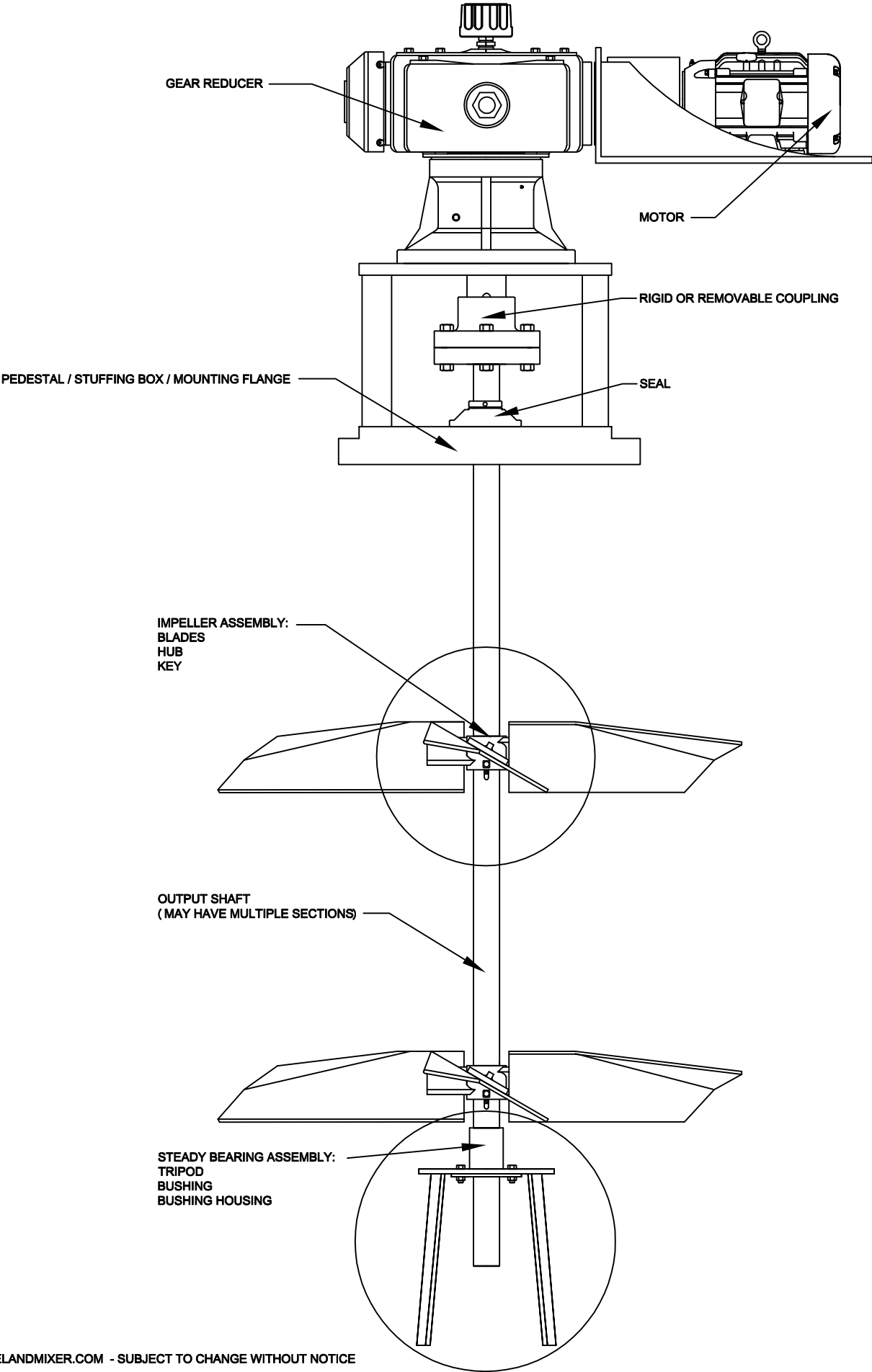
MOTOR / INPUT SHAFT COUPLING

FLEXIBLE COUPLING INSTALLATION INSTRUCTIONS

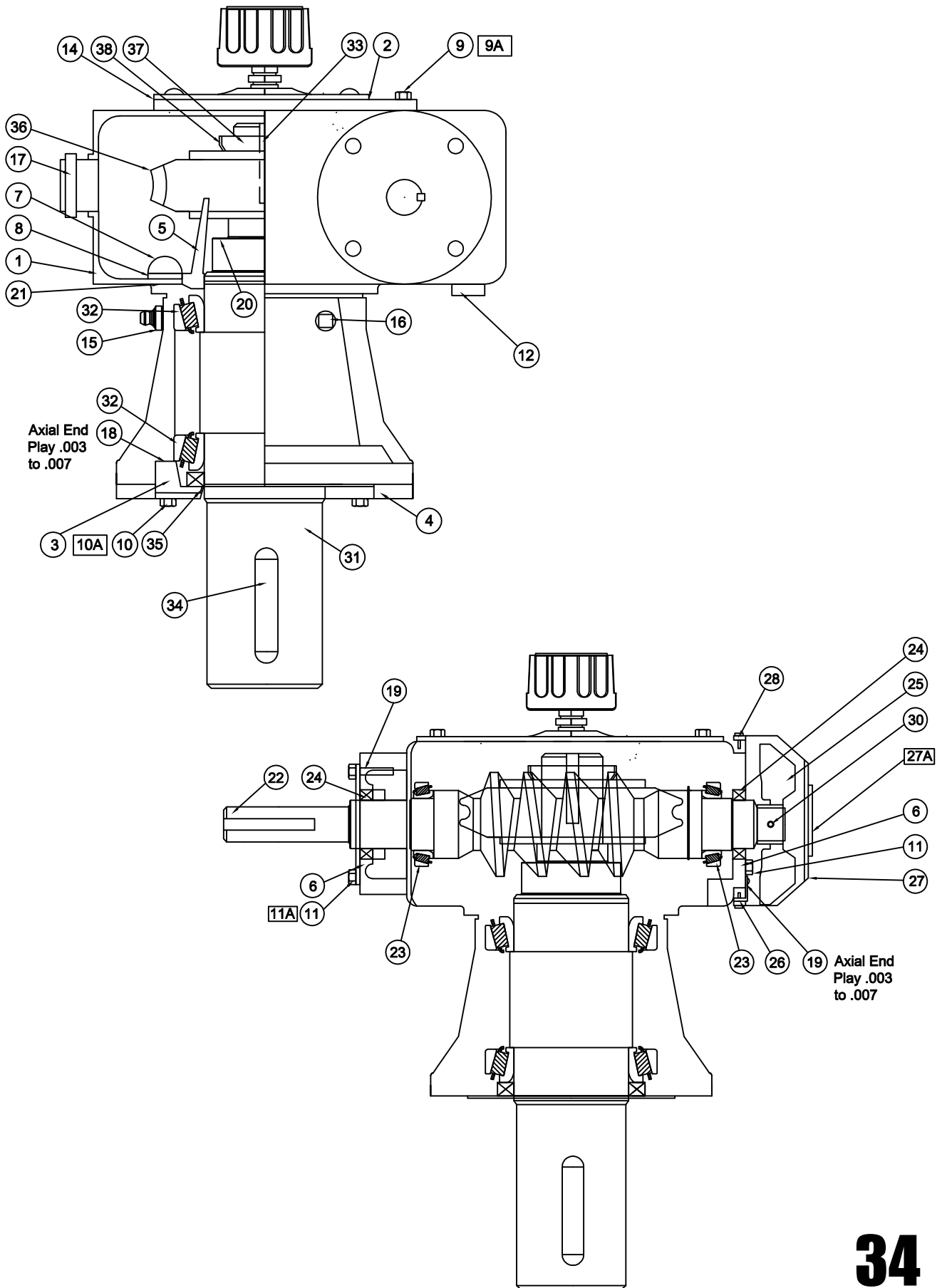
1. Measure the distance from the face of the input adapter to the face of the coupling.
2. Subtract the "X" dimension from the measured distance.
3. Use the measurement to locate the coupling from the face onto the shaft of the motor.
4. Once in place, tighten the set screw to lock the coupling in place. It is recommended that the key is staked or bonded in place to prohibit the key from vibrating out.
5. Mount the motor onto the input adapter with customer supplied bolts. Make sure that the coupling from the adapter and the motor engage securely. Use lock washers or Loctite to prevent the bolts from becoming loose from vibration.



REPLACEMENT MIXER PARTS - TOP ENTRY



PARTS BREAKDOWN FOR CLEVELAND AL-4 GEAR REDUCER



PARTS LIST FOR CLEVELAND AL-4 GEAR REDUCER - PAGE 1

When ordering parts, always specify mixer model, serial number and gear ratio. Gears are made custom to match the mixers reduction ratio. Please contact the factory with the mixers serial number to obtain gear and worm part numbers. Cleveland Mixer recommends replacing the gear and worm as a set.

***Hardware is not included on parts list. If you need to order mounting hardware, please contact the factory with hardware sizes and material.

REF. NUMBER	DESCRIPTION	MFG PART NUMBER	QTY. PER UNIT
1	PRIMARY HOUSING	DH26E-2X1	1
2	PRIMARY HOUSING COVER	DH27E-22	1
3	BEARING RETAINER	DH124E-23	1
4	ADAPTER	DH1300E-15X1	1
5	DRYWELL	DH33E-11	1
6	BEARING RETAINER	DH86E	2
7	1/2"-13X 1-1/4" Lg. SOC. Hd. CAPSCREW	003049	4
8	1/26" SPRING LOCKWASHER	002021	4
9	1/4"-20 X 5/8" Lg. BOLT - F.A.S.	005366	6
9A	1/4" SPRING LOCKWASHER	002017	6
10	5/16" - 18X1" Lg. BOLT - F.A.S.	005016	6
10A	5/16" SPRING LOCKWASHER	002018	6
11	5/16"-18x1" Lg. BOLT - F.A.S.	005016	8
11A	5/16" SPRING LOCKWASHER	002018	8
12	1/4" Sq. Hd. PIPE PLUG	012087	1
14	BREATHER	DH1307C-22	1
15	1610BL GREASE FITTING	317018	1

PARTS LIST FOR CLEVELAND AL-4 GEAR REDUCER - PAGE 2

When ordering parts, always specify mixer model, serial number and gear ratio.
Gears are made custom to match the mixers reduction ratio. Please contact the factory with the mixers serial number to obtain gear and worm part numbers.
Cleveland Mixer recommends replacing the gear and worm as a set.

***Hardware is not included on parts list. If you need to order mounting hardware, please contact the factory with hardware sizes and material.

REF. NUMBER	DESCRIPTION	MFG PART NUMBER	QTY. PER UNIT
16	47200 REILIEF FITTING	317019	1
17	OIL LEVEL SIGHT GUAGE	DH1204J-40	1
18	SHIM	DH1255E-25	TO SUITE
18	SHIM	DH1255E-25X1	TO SUITE
18	SHIM	DH1255E-25X2	TO SUITE
19	SHIM	DH1255E-1	TO SUITE
19	SHIM	DH1255E-1X1	TO SUITE
19	SHIM	DH1255E-1X2	TO SUITE
20	STEEL SHIMSTOCK	DH124E	TO SUITE
20	STEEL SHIMSTOCK	DH124EX1	TO SUITE
20	STEEL SHIMSTOCK	DH124EX2	TO SUITE
21	GASKET	DH25E-11	1
22	WORM	-	1
23	44131/44348 BEARING	315247	2
24	OIL SEAL - C/R 12350	DH37E-1	2
25	FAN	DH1293E	1
26	FAN HOUSING SUPPORT	DH1206E-1	2

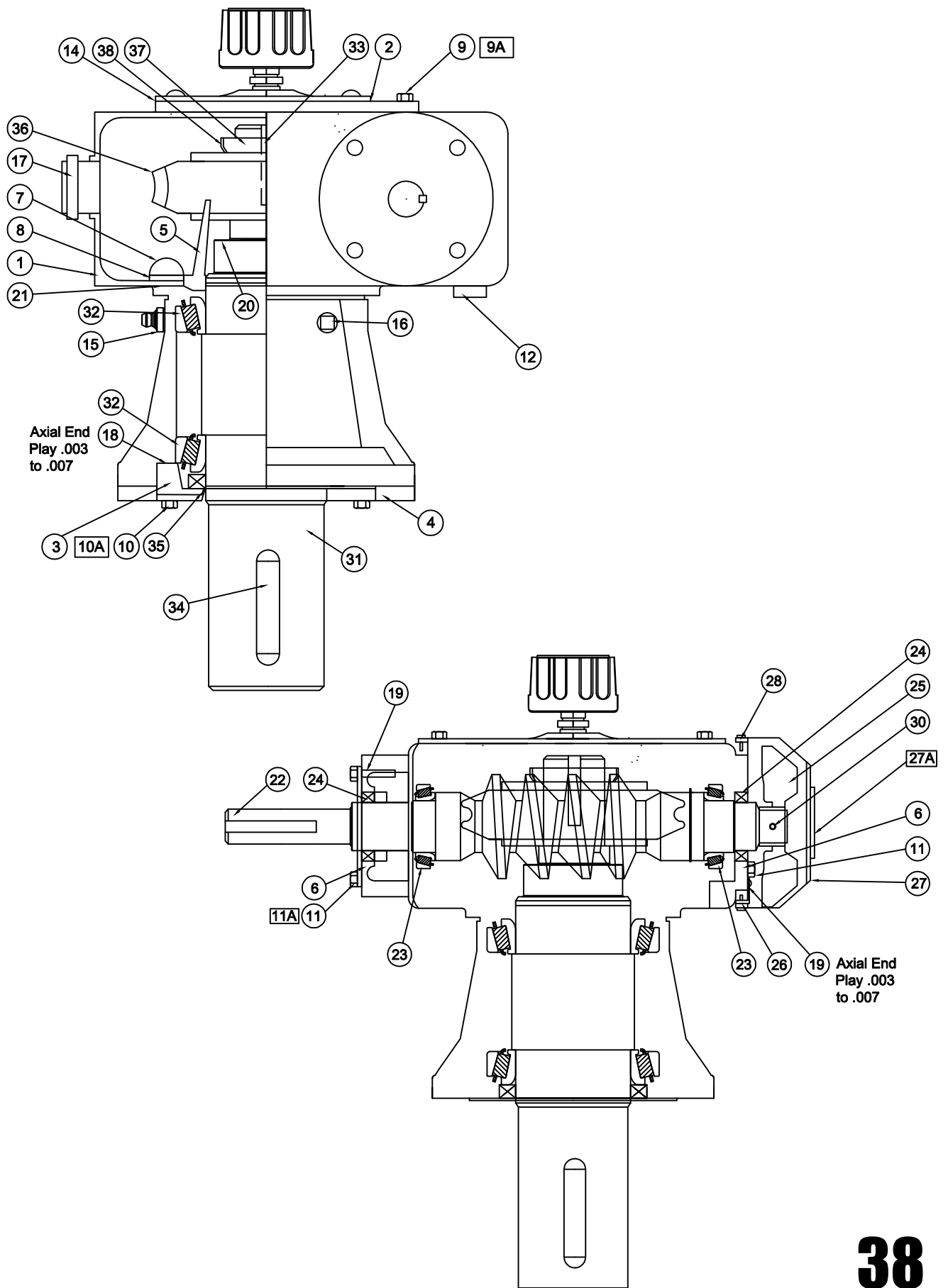
PARTS LIST FOR CLEVELAND AL-4 GEAR REDUCER - PAGE 3

When ordering parts, always specify mixer model, serial number and gear ratio. Gears are made custom to match the mixers reduction ratio. Please contact the factory with the mixers serial number to obtain gear and worm part numbers. Cleveland Mixer recommends replacing the gear and worm as a set.

***Hardware is not included on parts list. If you need to order mounting hardware, please contact the factory with hardware sizes and material.

REF. NUMBER	DESCRIPTION	MFG PART NUMBER	QTY. PER UNIT
27	FAN HOUSING	DH1294E-1	1
27A	BP 1-3/8" CAPLUG	297153	1
28	#10-24X5/8" Lg. HEX HEAD TAPTITE SCREW	299524	4
29	1/4" Sq. x 1-7/8" Lg. KEY	014223	1
30	1/4" -20x5/16" Lg. CONE Pt. SET SCREW	003375	1
31	GEAR SHAFT	DH60E-40	1
32	JM714249/JM714210 BEARING	299693	2
33	1/2" Sq. X 2-1/8" Lg. KEY	014227	1
34	3/4" X 1/2" X 3" Lg. KEY	014243	1
35	OIL SEAL C/R 29223	DH37E-16	1
36	GEAR	-	1
37	N-09 LOCKNUT	001117	1
38	W-09 LOCKWASHER	002008	1

PARTS BREAKDOWN FOR CLEVELAND AL-5 GEAR REDUCER



PARTS LIST FOR CLEVELAND AL-5 GEAR REDUCER - PAGE 1

When ordering parts, always specify mixer model, serial number and gear ratio.
Gears are made custom to match the mixers reduction ratio. Please contact the factory with the mixers serial number to obtain gear and worm part numbers.
Cleveland Mixer recommends replacing the gear and worm as a set.

***Hardware is not included on parts list. If you need to order mounting hardware, please contact the factory with hardware sizes and material.

REF. NUMBER	DESCRIPTION	MFG PART NUMBER	QTY. PER UNIT
1	PRIMARY HOUSING	DH26F-3X1	1
2	PRIMARY HOUSING COVER	DH27F-22	1
3	BEARING RETAINER	DH124F-25	1
4	ADAPTER	DH1300F-16X1	1
5	DRYWELL	DH33F-14	1
6	BEARING RETAINER	DH86Fx1	2
7	1/2"-13X 1-1/2" Lg. SOC. Hd. CAPSCREW	003050	6
8	1/2" SPRING LOCKWASHER	002021	6
9	1/4"-20 X 5/8" Lg. BOLT - F.A.S.	005366	6
9A	1/4" SPRING LOCKWASHER	002017	6
10	5/16" - 18X1" Lg. BOLT - F.A.S.	005016	6
10A	5/16" SPRING LOCKWASHER	002018	6
11	5/16"-18x1" Lg. BOLT - F.A.S.	005016	8
11A	5/16" SPRING LOCKWASHER	002018	4
12	1/4" Sq. Hd. PIPE PLUG	012087	1
14	BREATHER	DH1307C-22	1
15	1610BL GREASE FITTING	317018	1

PARTS LIST FOR CLEVELAND AL-5 GEAR REDUCER - PAGE 2

When ordering parts, always specify mixer model, serial number and gear ratio. Gears are made custom to match the mixers reduction ratio. Please contact the factory with the mixers serial number to obtain gear and worm part numbers. Cleveland Mixer recommends replacing the gear and worm as a set.

***Hardware is not included on parts list. If you need to order mounting hardware, please contact the factory with hardware sizes and material.

REF. NUMBER	DESCRIPTION	MFG PART NUMBER	QTY. PER UNIT
16	47200 REILIEF FITTING	317019	1
17	OIL LEVEL SIGHT GUAGE	DH1204J-40	1
18	SHIM	DH1255F-20	TO SUITE
18	SHIM	DH1255F-20x1	TO SUITE
18	SHIM	DH1255F-20x2	TO SUITE
19	SHIM	DH1255F-1	TO SUITE
19	SHIM	DH1255F-1x1	TO SUITE
19	SHIM	DH1255F-1x2	TO SUITE
20	STEEL SHIMSTOCK	DH1242F	TO SUITE
20	STEEL SHIMSTOCK	DH1242Fx1	TO SUITE
20	STEEL SHIMSTOCK	DH1242Fx2	TO SUITE
21	GASKET	DH25F-12	1
22	WORM	-	1
23	55175/55437 BEARING	315453	2
24	OIL SEAL - C/R 15005	DH37F-1	2
25	FAN	DH1293F	1
26	FAN HOUSING SUPPORT	DH1206F-1	2

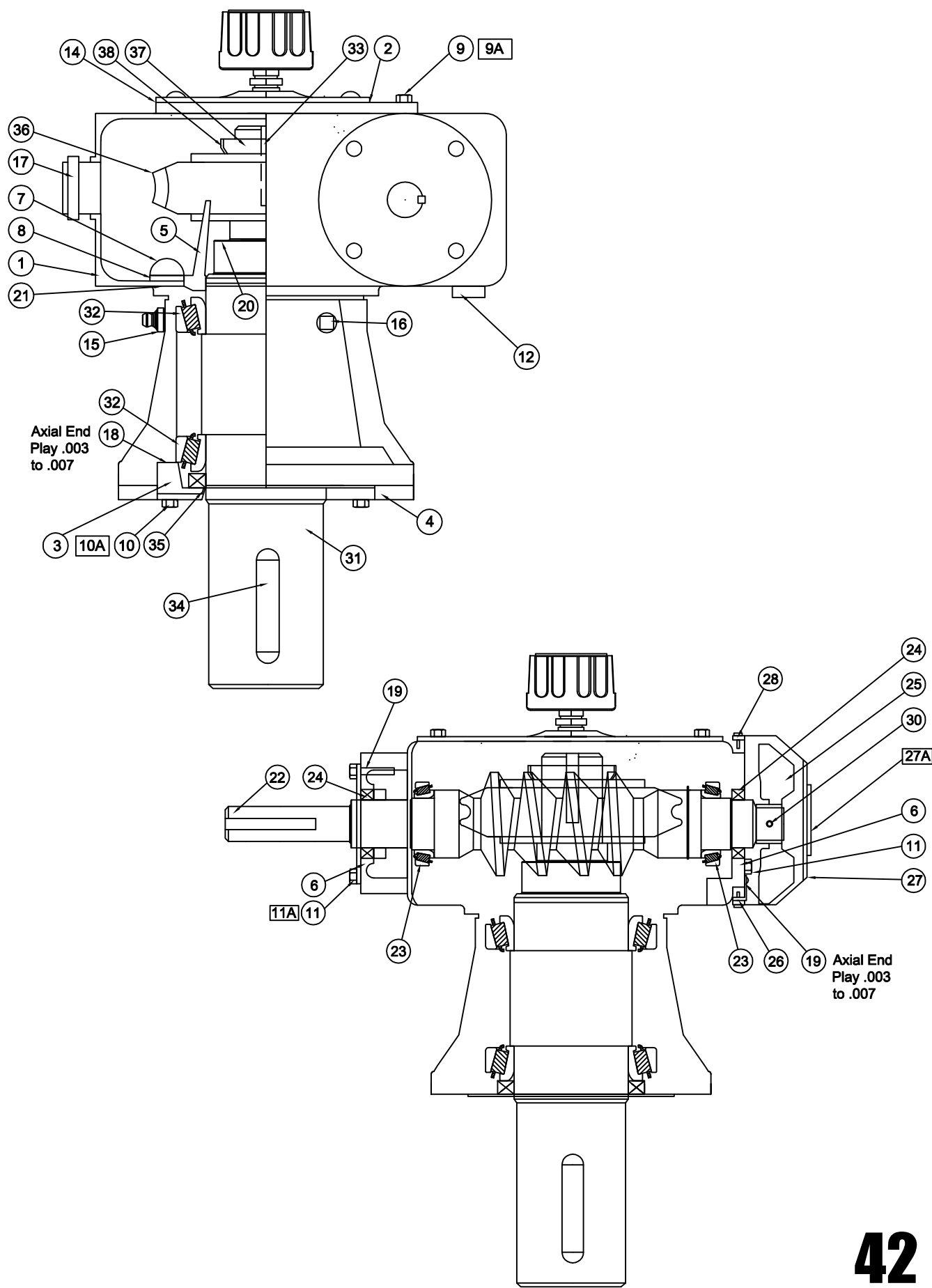
PARTS LIST FOR CLEVELAND AL-5 GEAR REDUCER - PAGE 3

When ordering parts, always specify mixer model, serial number and gear ratio.
Gears are made custom to match the mixers reduction ratio. Please contact the factory with the mixers serial number to obtain gear and worm part numbers.
Cleveland Mixer recommends replacing the gear and worm as a set.

***Hardware is not included on parts list. If you need to order mounting hardware, please contact the factory with hardware sizes and material.

REF. NUMBER	DESCRIPTION	MFG PART NUMBER	QTY. PER UNIT
27	FAN HOUSING	DH1294F-1	1
27A	BP 1-5/8" CAPPLUG	297154	1
28	#10-24X5/8" Lg. HEX HEAD TAPTITE SCREW	299524	4
29	5/16" Sq. x 2-1/16" Lg. KEY	014224	1
30	1/4" -20x5/16" Lg. CONE Pt. SET SCREW	003375	1
31	GEAR SHAFT	DH60F-65	1
32	JM716649/JM716610 BEARING	299692	2
33	1/2" Sq. X 2-5/8" Lg. KEY	014227	1
34	3/4" X 1/2" X 3" Lg. KEY	014243	1
35	OIL SEAL C/R 32393	DH37F-20	1
36	GEAR	-	1
37	N-10 LOCKNUT	001118	1
38	W-10 LOCKWASHER	002009	1

PARTS BREAKDOWN FOR CLEVELAND AL-6 GEAR REDUCER



PARTS LIST FOR CLEVELAND AL-6 GEAR REDUCER - PAGE 1

When ordering parts, always specify mixer model, serial number and gear ratio. Gears are made custom to match the mixers reduction ratio. Please contact the factory with the mixers serial number to obtain gear and worm part numbers. Cleveland Mixer recommends replacing the gear and worm as a set.

***Hardware is not included on parts list. If you need to order mounting hardware, please contact the factory with hardware sizes and material.

REF. NUMBER	DESCRIPTION	MFG PART NUMBER	QTY. PER UNIT
1	PRIMARY HOUSING	DH26G-2X1	1
2	PRIMARY HOUSING COVER	DH27G-22	1
3	BEARING RETAINER	DH124G-24	1
4	ADAPTER	DH1300G-17X1	1
5	DRYWELL	DH33G-11	1
6	BEARING RETAINER	DH86Gx1	2
7	5/8" - 11 x 1-1/2" Lg. SOC. Hd. CAPSCREW	003378	6
8	5/8" SPRING LOCKWASHER	002022	6
9	5/16" - 18 x 1" Lg. BOLT - F.A.S.	005016	8
9A	5/16" SPRING LOCKWASHER	002018	8
10	3/8" - 16 x 3/4" Lg. BOLT - F.A.S.	005025	6
10A	3/8" SPRING LOCKWASHER	002019	6
11	7/16" - 14 x 1-1/4" Lg. BOLT - F.A.S.	005045	8
11A	7/16" SPRING LOCKWASHER	002020	4
12	3/8" Sq. Hd. PIPE PLUG	012088	1
14	BREATHER	DH1307C-22	1
15	1610BL GREASE FITTING	317018	1

PARTS LIST FOR CLEVELAND AL-6 GEAR REDUCER - PAGE 2

When ordering parts, always specify mixer model, serial number and gear ratio. Gears are made custom to match the mixers reduction ratio. Please contact the factory with the mixers serial number to obtain gear and worm part numbers. Cleveland Mixer recommends replacing the gear and worm as a set.

***Hardware is not included on parts list. If you need to order mounting hardware, please contact the factory with hardware sizes and material.

REF. NUMBER	DESCRIPTION	MFG PART NUMBER	QTY. PER UNIT
16	47200 RELIEF FITTING	317019	1
17	OIL LEVEL SIGHT GUAGE	DH1204J-40	1
18	SHIM	DH1255G-22	TO SUITE
18	SHIM	DH1255G-22x1	TO SUITE
18	SHIM	DH1255G-22x2	TO SUITE
19	SHIM	DH1255G-1	TO SUITE
19	SHIM	DH1255G-1x1	TO SUITE
19	SHIM	DH1255G-1x2	TO SUITE
20	STEEL SHIMSTOCK	DH1242G	TO SUITE
20	STEEL SHIMSTOCK	DH1242Gx1	TO SUITE
20	STEEL SHIMSTOCK	DH1242Gx2	TO SUITE
21	GASKET	DH25G-13	1
22	WORM	-	1
23	72187/72487 BEARING	315454	2
24	OIL SEAL - C/R 17387	DH37G-1	2
25	FAN	DH1293G	1
26	FAN HOUSING SUPPORT	DH1206G-1	2

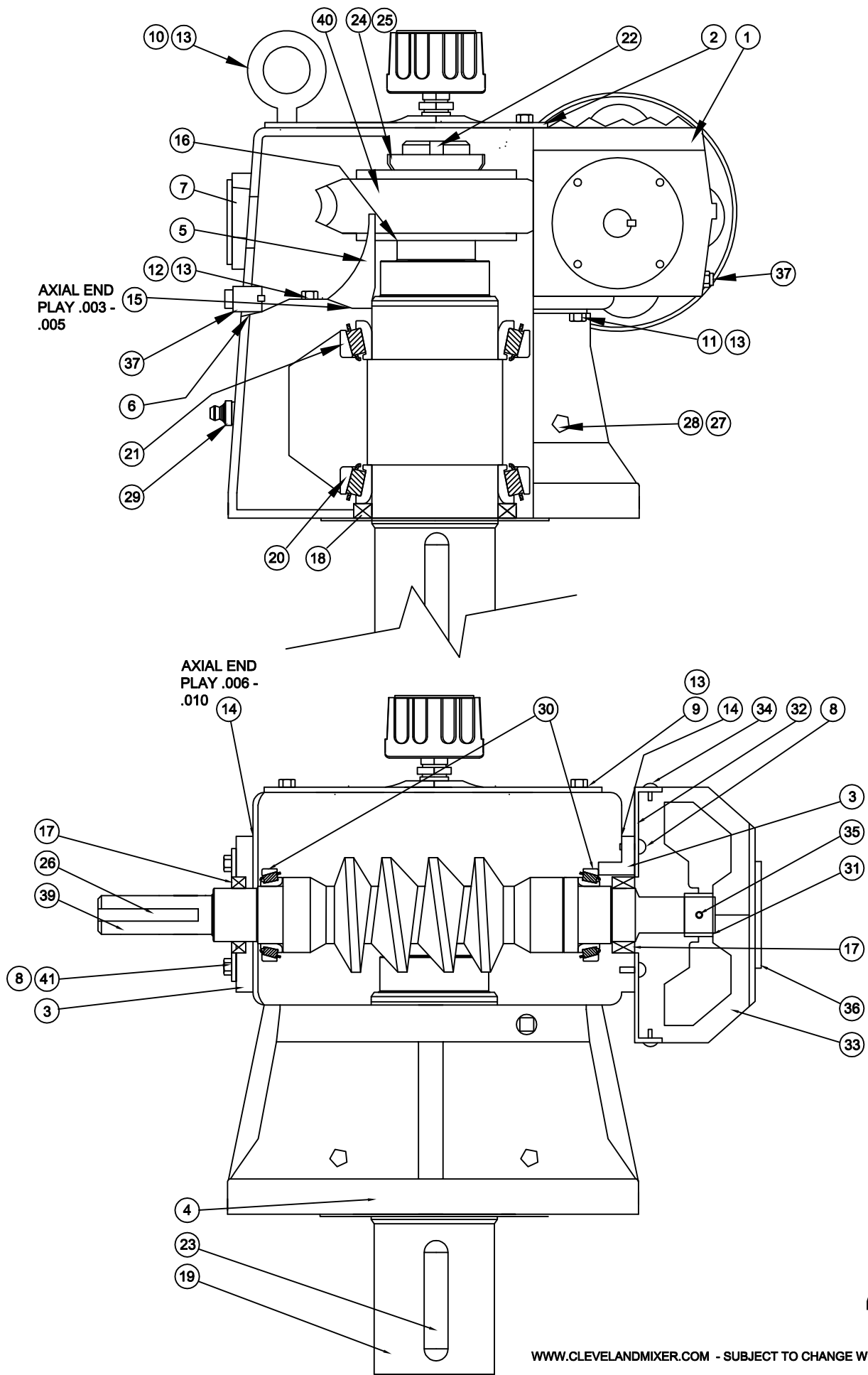
PARTS LIST FOR CLEVELAND AL-6 GEAR REDUCER - PAGE 3

When ordering parts, always specify mixer model, serial number and gear ratio. Gears are made custom to match the mixers reduction ratio. Please contact the factory with the mixers serial number to obtain gear and worm part numbers. Cleveland Mixer recommends replacing the gear and worm as a set.

***Hardware is not included on parts list. If you need to order mounting hardware, please contact the factory with hardware sizes and material.

REF. NUMBER	DESCRIPTION	MFG PART NUMBER	QTY. PER UNIT
27	FAN HOUSING	DH1294G-1	1
27A	BP 1-7/8" CAPLUG	297155	1
28	#10-24X5/8" Lg. HEX HEAD TAPTITE SCREW	299524	4
29	3/8" Sq. x 2-7/16" Lg. KEY	014225	1
30	1/4" -20x5/16" Lg. CONE Pt. SET SCREW	003375	1
31	GEAR SHAFT	DH60G-48	1
32	594/592XS BEARING	299602	2
33	5/8" Sq. x 3.00" Lg. KEY	014228	1
34	KEY	DH63G-20	1
35	OIL SEAL C/R 34886	DH37L	1
36	GEAR	-	1
37	N-12 LOCKNUT	001120	1
38	W-12 LOCKWASHER	002011	1

PARTS BREAKDOWN FOR CLEVELAND AL-7 GEAR REDUCER



PARTS LIST FOR CLEVELAND AL-7 GEAR REDUCER - PAGE 1

When ordering parts, always specify mixer model, serial number and gear ratio. Gears are made custom to match the mixers reduction ratio. Please contact the factory with the mixers serial number to obtain gear and worm part numbers. Cleveland Mixer recommends replacing the gear and worm as a set.

***Hardware is not included on parts list. If you need to order mounting hardware, please contact the factory with hardware sizes and material.

REF. NUMBER	DESCRIPTION	MFG PART NUMBER	QTY. PER UNIT
1	PRIMARY HOUSING	DH20Hx1	1
2	PRIMARY HOUSING COVER	DH23H-60	1
3	BEARING RETAINER	DH86Hx1	2
4	PEDESTAL	DH370H-60x1	1
5	DRYWELL	DH33H-50	1
6	GASKET	DH25H-12	1
7	1" GITS SIGHT GLASS W/ REFLECTOR	DH1204H-40	1
8	7/16" - 14 x 1-1/4" Lg. HEX BOLT	005045	8
9	1/2-13 x 1" IG. HEX BOLT	005047	4
10	1/2-13 x 7/8" Lg. SHOULDER EYEBOLT	318162	2
11	1/2 - 13 x 1-3/4" Lg. HEX BOLT	005053	12
12	1/2 - 13 x 1-1/2" Lg. HEX BOLT	005051	6
13	1/2" SPRING LOCKWASHER	002021	24
14	SHIM	DH1255G-1	-
14	SHIM	DH1255G-1x1	-
14	SHIM	DH1255G-1x2	-
15	SHIM	DH1255H-50	-

PARTS LIST FOR CLEVELAND AL-7 GEAR REDUCER - PAGE 2

When ordering parts, always specify mixer model, serial number and gear ratio.
Gears are made custom to match the mixers reduction ratio. Please contact the factory with the mixers serial number to obtain gear and worm part numbers.
Cleveland Mixer recommends replacing the gear and worm as a set.

***Hardware is not included on parts list. If you need to order mounting hardware, please contact the factory with hardware sizes and material.

REF. NUMBER	DESCRIPTION	MFG PART NUMBER	QTY. PER UNIT
15	SHIM	DH1255H-50x1	-
15	SHIM	DH1255H-50x2	-
16	SHIM	DH1242H-12	TO SUITE
16	SHIM	DH1242H-12x1	TO SUITE
16	SHIM	DH1242H-12x2	TO SUITE
17	OIL SEAL - C/R 545185	DH37G-1	2
18	OIL SEAL C/R 42419	DH37V-12	1
19	GEAR SHAFT	DH60H-60	1
20	BEARING - 64450/64700	297202	1
21	BEARING - JHM522649/JHM522610	299922	1
22	KEY	014229-3.500	1
23	KEY	014230-3.500	1
24	TN-14 LOCKNUT	001104	1
25	TW-114 LOCK WASHER	002082	1
26	KEY	014225-2.750	1
27	PIPE BUSHING	012309	1
28	ALEMITE 47200 RELIEFE FITTING	317019	1

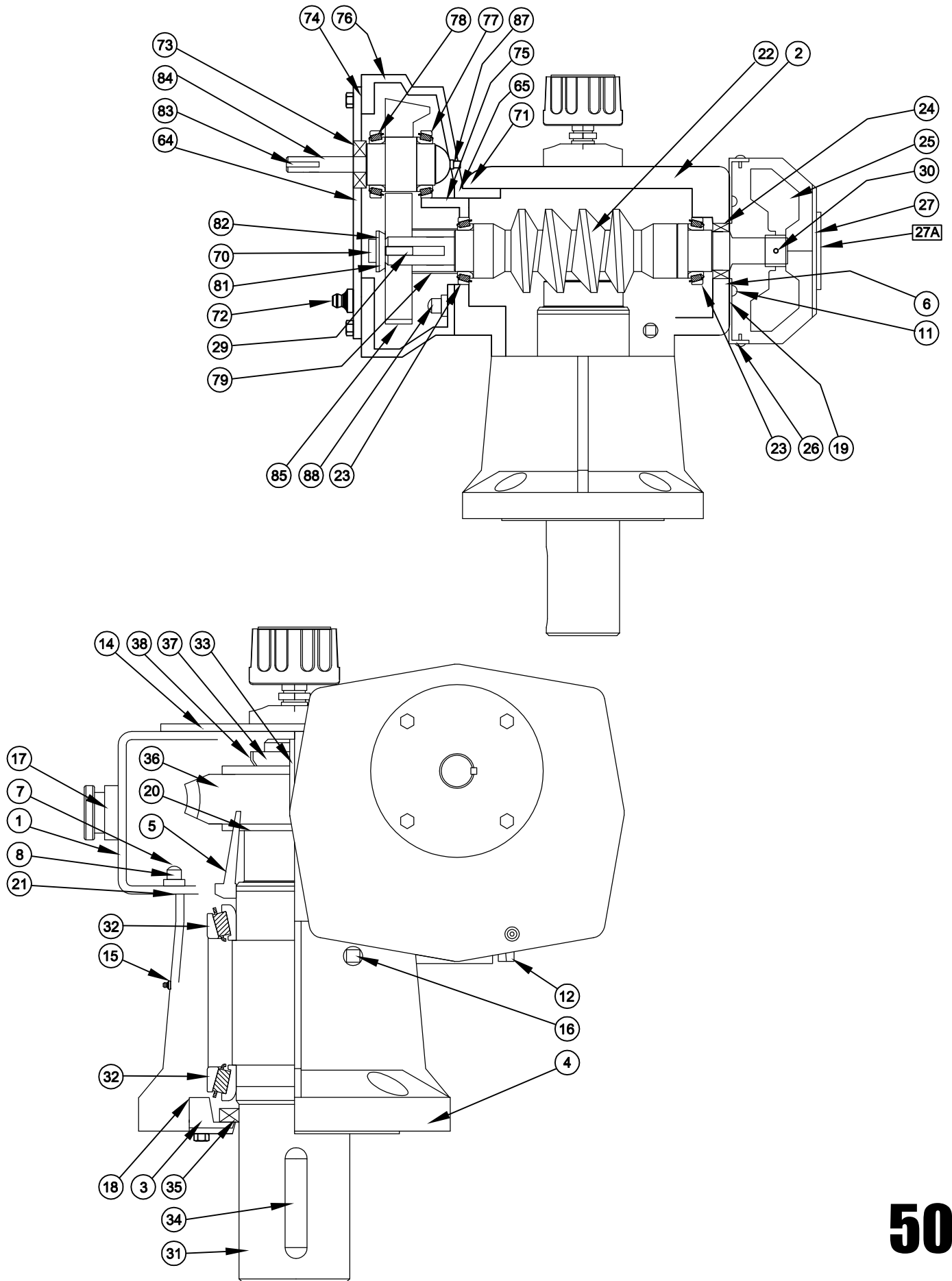
PARTS LIST FOR CLEVELAND AL-7 GEAR REDUCER - PAGE 3

When ordering parts, always specify mixer model, serial number and gear ratio.
Gears are made custom to match the mixers reduction ratio. Please contact the factory with the mixers serial number to obtain gear and worm part numbers.
Cleveland Mixer recommends replacing the gear and worm as a set.

***Hardware is not included on parts list. If you need to order mounting hardware, please contact the factory with hardware sizes and material.

REF. NUMBER	DESCRIPTION	MFG PART NUMBER	QTY. PER UNIT
29	1627-B GREASE FITTING	317023	1
30	BEARING - 72187/72487	315454	2
31	FAN	DH1293H-1x1	1
32	FAN HOUSING SUPPORT	DH1206H-1	2
33	FAN HOUSING	DH1294H-1	1
34	TAPTITE SCREW	299524	4
35	CONE POINT SET SCREW	003375	1
36	22-S CAPLUG	297156	1
39	WORM	-	1
40	GEAR	-	1

PARTS BREAKDOWN FOR CLEVELAND ALD-4 GEAR REDUCER



When ordering parts, always specify mixer model, serial number and gear ratio. Gears are made custom to match the mixers reduction ratio. Please contact the factory with the mixers serial number to obtain gear and worm part numbers. Cleveland Mixer recommends replacing the gear and worm as a set. Please call the factory with your serial number to obtain parts lists for ALD sizes 5 and up.

***Hardware is not included on parts list. If you need to order mounting hardware, please contact the factory with hardware sizes and material.

REF. NUMBER	DESCRIPTION	MFG PART NUMBER	QTY. PER UNIT
1	PRIMARY HOUSING	DH26E-2X1	1
2	PRIMARY HOUSING COVER	DH27E-22	1
3	BEARING RETAINER	DH124E-23	1
4	ADAPTER	DH1300E-15X1	1
5	DRYWELL	DH33E-11	1
6	BEARING RETAINER	DH86E	2
7	1/2"-13X 1-1/4" Lg. SOC. Hd. CAPSCREW	003049	4
8	1/2" SPRING LOCKWASHER	002021	4
9	1/4"-20 X 5/8" Lg. BOLT - F.A.S.	005366	6
9A	1/4" SPRING LOCKWASHER	002017	6
10	5/16" - 18X1" Lg. BOLT - F.A.S.	005016	6
10A	5/16" SPRING LOCKWASHER	002018	6
11	5/16"-18x1" Lg. BOLT - F.A.S.	005016	8
11A	5/16" SPRING LOCKWASHER	002018	8
12	1/4" Sq. Hd. PIPE PLUG	012087	1
14	BREATHER	DH1307C-22	1
15	1610BL GREASE FITTING	317018	1

PARTS LIST FOR CLEVELAND ALD-4 GEAR REDUCER - PAGE 2

When ordering parts, always specify mixer model, serial number and gear ratio. Gears are made custom to match the mixers reduction ratio. Please contact the factory with the mixers serial number to obtain gear and worm part numbers. Cleveland Mixer recommends replacing the gear and worm as a set. Please call the factory with your serial number to obtain parts lists for ALD sizes 5 and up.

***Hardware is not included on parts list. If you need to order mounting hardware, please contact the factory with hardware sizes and material.

REF. NUMBER	DESCRIPTION	MFG PART NUMBER	QTY. PER UNIT
16	47200 REILIEF FITTING	317019	1
17	OIL LEVEL SIGHT GUAGE	DH1204J-40	1
18	SHIM	DH1255E-25	TO SUITE
18	SHIM	DH1255E-25X1	TO SUITE
18	SHIM	DH1255E-25X2	TO SUITE
19	SHIM	DH1255E-1	TO SUITE
19	SHIM	DH1255E-1X1	TO SUITE
19	SHIM	DH1255E-1X2	TO SUITE
20	STEEL SHIMSTOCK	DH1242E	TO SUITE
20	STEEL SHIMSTOCK	DH124EX1	TO SUITE
20	STEEL SHIMSTOCK	DH124EX2	TO SUITE
21	GASKET	DH25E-11	1
22	WORM	-	1
23	44131/44348 BEARING	315247	2
24	OIL SEAL - C/R 12350	DH37E-1	2
25	FAN	DH1293E	1
26	FAN HOUSING SUPPORT	DH1206E-1	2

PARTS LIST FOR CLEVELAND ALD-4 GEAR REDUCER - PAGE 3

When ordering parts, always specify mixer model, serial number and gear ratio. Gears are made custom to match the mixers reduction ratio. Please contact the factory with the mixers serial number to obtain gear and worm part numbers. Cleveland Mixer recommends replacing the gear and worm as a set. Please call the factory with your serial number to obtain parts lists for ALD sizes 5 and up.

***Hardware is not included on parts list. If you need to order mounting hardware, please contact the factory with hardware sizes and material.

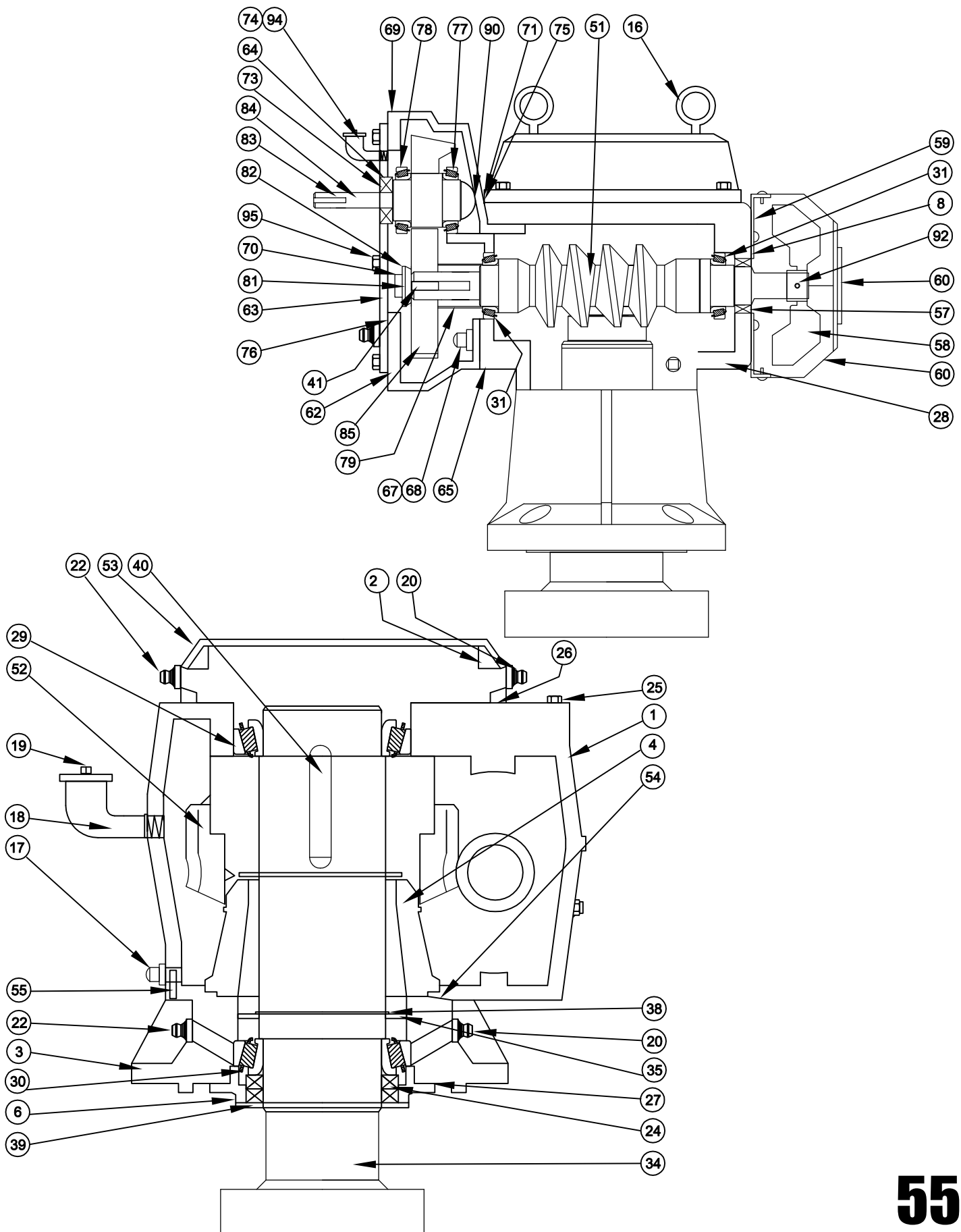
REF. NUMBER	DESCRIPTION	MFG PART NUMBER	QTY. PER UNIT
27	FAN HOUSING	DH1294E-1	1
27A	BP 1-3/8" CAPLUG	297153	1
28	#10-24X5/8" Lg. HEX HEAD TAPTITE SCREW	299524	4
29	1/4" Sq. x 1-7/8" Lg. KEY	014223	1
30	1/4" -20x5/16" Lg. CONE Pt. SET SCREW	003375	1
31	GEAR SHAFT	DH60E-40	1
32	JM714249/JM714210 BEARING	299693	2
33	1/2" Sq. X 2-1/8" Lg. KEY	014227	1
34	3/4" X 1/2" X 3" Lg. KEY	014243	1
35	OIL SEAL C/R 29223	DH37E-16	1
36	GEAR	-	1
37	N-09 LOCKNUT	001118	1
38	W-09 LOCKWASHER	002008	1
62	HELICAL HOUSING ASSEMBLY	DH26E-4x1	1
63	HELICAL HOUSING ASSEMBLY	DH26E-4x1	1
64	SEAL PLATE	DH1259E	1
65	BUSHING	DH1218E-1x1	1

When ordering parts, always specify mixer model, serial number and gear ratio. Gears are made custom to match the mixers reduction ratio. Please contact the factory with the mixers serial number to obtain gear and worm part numbers. Cleveland Mixer recommends replacing the gear and worm as a set. Please call the factory with your serial number to obtain parts lists for ALD sizes 5 and up.

***Hardware is not included on parts list. If you need to order mounting hardware, please contact the factory with hardware sizes and material.

REF. NUMBER	DESCRIPTION	MFG PART NUMBER	QTY. PER UNIT
66	HELICAL HOUSING ASSEMBLY	DH26E-4x1	1
69	HELICAL HOUSING ASSEMBLY	DH26E-4x1	1
71	GASKET	DH25A	1
72	1/4" sq. HEAD PIPE PLUG	012087	4
73	OIL SEAL C/R 9663	DH37E-10	1
74	SHIM	DH1255E-4	1
74	SHIM	DH1255E-4x1	2
75	GASKET	DH25E-5	1
76	GASKET	DH25E-4	1
77	6304 SKF BEARING	PP551A	1
78	5505 NEW DEPARTURE BEARING	PP1164A	1
82	LOCKING PLATE	DH1298E-4	1
83	KEY	014222	1
84	HELICAL PINION	DH416	1
85	HELICAL GEAR	DH429	1
87	EXPANSION PLUG	299942	1

PARTS BREAKDOWN FOR CLEVELAND AD-4 GEAR REDUCER



PARTS LIST FOR CLEVELAND AD-4 GEAR REDUCER - PAGE 1

When ordering parts, always specify mixer model, serial number and gear ratio. Gears are made custom to match the mixers reduction ratio. Please contact the factory with the mixers serial number to obtain gear and worm part numbers. Cleveland Mixer recommends replacing the gear and worm as a set. Please call the factory with your serial number to obtain parts lists for AD sizes 5 and up.

***Hardware is not included on parts list. If you need to order mounting hardware, please contact the factory with hardware sizes and material.

REF. NUMBER	DESCRIPTION	MFG PART NUMBER	QTY. PER UNIT
1	PRIMARY HOUSING	DH26E-1X1	1
2	PRIMARY HOUSING COVER	DH23E-40x1	1
3	ADAPTER	DH370E-40x1	1
4	DRYWELL	DH33E-40	1
6	BEARING RETAINER	DH124E-40	1
8	BEARING RETAINER	DH36E	1
16	1/4" - 20 x 5/8" SHOULDERED EYE BOLT	318158	2
17	1/4" Sq. Hd. PIPE PLUG	012087	2
18	3/8" NPT 90° STREET ELBOW	012135	1
19	DIP STICK	DH1279E-40	1
20	ALEMITE #1610-B GR. FTG	317018	2
22	ALEMITE #47200 GR. FTG	317019	2
24	OIL SEAL GARLOCK 23X6363	DH37E-40	2
25	BREATHER	DH1307A-30	1
26	SHIM	DH1255E	-
26	SHIM	DH1255Ex1	-
26	SHIM	DH1255Ex2	-

PARTS LIST FOR CLEVELAND AD-4 GEAR REDUCER - PAGE 2

When ordering parts, always specify mixer model, serial number and gear ratio.

Gears are made custom to match the mixers reduction ratio. Please contact the factory with the mixers serial number to obtain gear and worm part numbers.

Cleveland Mixer recommends replacing the gear and worm as a set. Please call the factory with your serial number to obtain parts lists for AD sizes 5 and up.

***Hardware is not included on parts list. If you need to order mounting hardware, please contact the factory with hardware sizes and material.

REF. NUMBER	DESCRIPTION	MFG PART NUMBER	QTY. PER UNIT
27	SHIM	DH1255E-40	-
28	SHIM	DH1255E-1	-
28	SHIM	DH1255E-1x1	-
28	SHIM	DH1255E-1x2	-
29	37425/37625 TIM BEARING	315559	1
30	37431/37625 TIM BEARING	315571	1
31	44131/44348 TIM BEARING	315247	2
31	44131/44348 TIM BEARING	315247	2
34	GEAR SHAFT	DH61E-40	1
35	GEAR SHAFT SPACER	DH1231E-40	1
38	5100-425 Ext. TRUARC SNAP RING	321210	2
39	SEAL PLATE	DH1259E-40	1
40	1/2 X 3/8" X 2-7/8" KEY	014237	1
41	1/4 X 1/4 X 1-13/16" KEY	014223	1
51	WORM	DWXXX-XX	1
52	GEAR	DGXXX-XX	1
53	CLOSURE	DH1203M-1	1

PARTS LIST FOR CLEVELAND AD-4 GEAR REDUCER - PAGE 3

When ordering parts, always specify mixer model, serial number and gear ratio. Gears are made custom to match the mixers reduction ratio. Please contact the factory with the mixers serial number to obtain gear and worm part numbers. Cleveland Mixer recommends replacing the gear and worm as a set. Please call the factory with your serial number to obtain parts lists for AD sizes 5 and up.

***Hardware is not included on parts list. If you need to order mounting hardware, please contact the factory with hardware sizes and material.

REF. NUMBER	DESCRIPTION	MFG PART NUMBER	QTY. PER UNIT
54	2-263N219-7 PARKER O-RING	320132	1
55	DOWEL PIN	010206	1
56	SHIM	DH1242E-40	-
56	SHIM	DH1242E-40x1	-
57	OIL SEAL C/R 12350	DH37E-1	1
58	FAN	DH1298E	1
59	FAN HOUSING SUPPORT	DH1206E-1	2
60	FAN HOUSING	DH1294E-1	1
60A	BP CAP PLUG	297153	1
62	HELICAL HOUSING ASSY	DH26E-4x1	1
63	HELICAL HOUSING ASSY	DH26E-4x1	1
64	SEAL PLATE	DH1259E-4	1
65	BUSHING	DH1218E-1x1	1
66	HELICAL HOUSING ASSY	DH26E-4x1	1
69	HELICAL HOUSING ASSY	DH26E-4x1	1
71	GASKET	DH25A	1
72	1/4" Sq. Hd. PIPE PLUG	012087	4

PARTS LIST FOR CLEVELAND AD-4 GEAR REDUCER - PAGE 4

When ordering parts, always specify mixer model, serial number and gear ratio. Gears are made custom to match the mixers reduction ratio. Please contact the factory with the mixers serial number to obtain gear and worm part numbers. Cleveland Mixer recommends replacing the gear and worm as a set. Please call the factory with your serial number to obtain parts lists for AD sizes 5 and up.

***Hardware is not included on parts list. If you need to order mounting hardware, please contact the factory with hardware sizes and material.

REF. NUMBER	DESCRIPTION	MFG PART NUMBER	QTY. PER UNIT
73	OIL SEAL C/R 9663	DH37E-10	1
74	SHIM	DH1255E-4	-
74	SHIM	DH1255E-4x1	-
75	GASKET	DH25E-5	1
76	GASKET	DH25E-4	1
77	6304 SKF BEARING	PP551A	1
78	5505 NEW DEPTARTURE BEARING	PP1164A	1
82	LOCKING PLATE	DH1298E-4	1
83	KEY	014222	1
84	HELICAL PINION	DH416	1
85	HELICAL GEAR	DH429	1
90	DORMAN P3C CLOSURE	299942	1
94	31/4" NPT 90° STREET ELBOW	012134	1
95	OIL LEVEL SIGHT GLASS	DH1204E	1

SERVICE RECORDS

DATES	NOTES