



A brand of Subiaco, Inc.

INSTALLATION, OPERATION & MAINTENANCE INSTRUCTIONS FOR CLEVELAND MIXER RXT & APD AGITATORS

Models: RXT, RXTO, RXTS,
RXTM, RXT - 2M

Models: APD, APDO, APDS,
APDM, APD-2M, SDM, SDS



RXT & APD AGITATOR MANUAL

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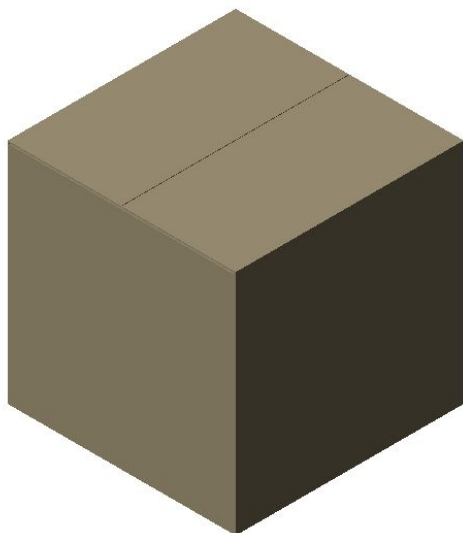
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RECEIVING AND UNPACKING YOUR MIXER

Be sure to use care when uncrating, unpacking, lifting and handling your mixer. Certain parts such as impeller blades, hubs, couplings, steady bearings, seals, keys, hardware and other mixer accessories may be packed in boxes inside of crates or bolted down to skids. Do not discard any packing crates or materials until you've accounted for all the parts of your mixer assembly.

Make sure to check the packing slip for your shipment to make sure you've received the correct number of skids, crates and cartons. If any of the shipment was not delivered or delivered with visible damage, please contact the carrier to report the missing pieces or damage. Once you've contacted the carrier, please contact Cleveland Mixer so we can document the issue.

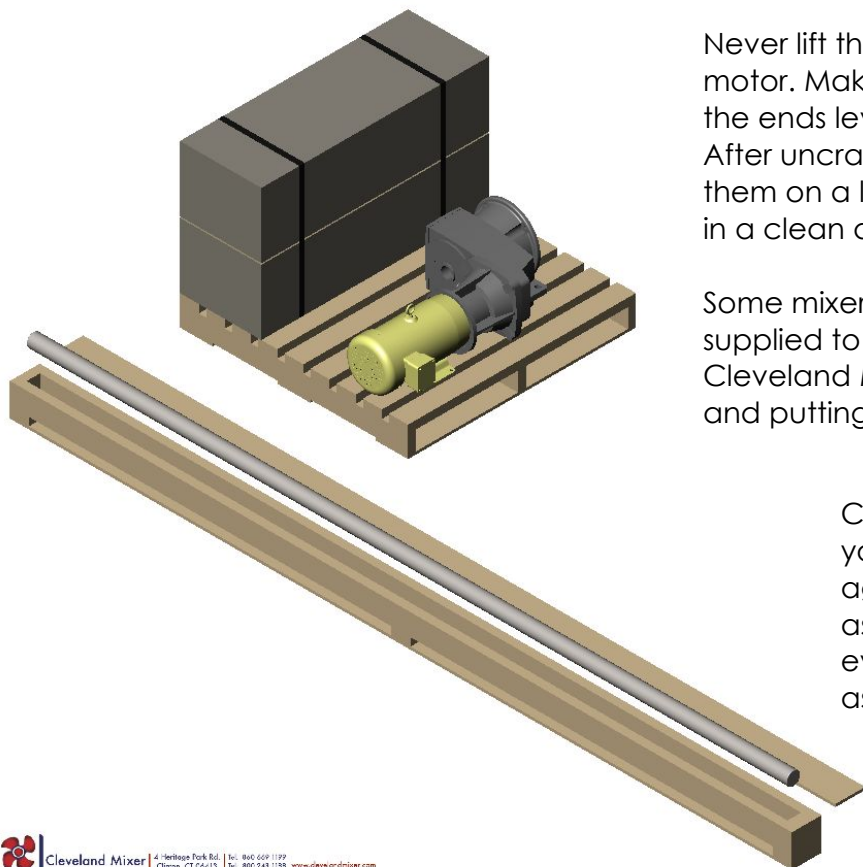


The weight of the mixer will be indicated on the mixer's assembly drawing and also in the shipping documents. It's important that the mixer be moved and installed by professionals. Any attempt to lift or move the mixer by an unqualified party can result in serious injury and catastrophic damage to the mixer.

The drive end of the mixer might be top heavy. Never upright a mixer drive without the proper bracing. Doing so might result in the drive falling over and causing injury or damage to equipment.

Never lift the drive end of the mixer by the motor. Make sure when lifting shafting to keep the ends level so not to bend the shafting. After uncrating the mixer and parts, stage them on a level surface preferably indoors or in a clean dry location.

Some mixer parts such as shaft pullers are supplied to perform future maintenance. Cleveland Mixer suggest labeling these parts and putting them into storage.



Cleveland Mixer suggests checking your unpacked mixer assembly parts against your packing slip and assembly drawing to make sure everything is accounted for before assembling your mixer.



INSTALLATION SITE

Mixer drives must be properly installed if they are to produce the rated torque. Improper installation may lead to oil leaks, reduced life or even catastrophic failure. Cleveland Mixers are intended to be installed under the following conditions:

- Unimpeded airflow to and around the mixer.
- Accessibility to oil drain, motor, seal and breather plugs.
- Mounting surfaces must be level, torsional rigid and dampened against vibration.
- Unless special measures are taken, the immediate vicinity around the mixer drive should not be exposed to any aggressive or corrosive substances or gases.
- If the mixer has a steady bearing, the shaft and tripod must be properly aligned.
- All bolt connection surfaces must be clean and free from contamination or corrosion.
- Tank walls must be designed to withstand forces created by the mixer.
- Sufficient headroom over the mixer for installation and to be able to perform annual maintenance on the mixer.
- Designed input voltage or air pressure to run motor. Access to flush materials for seals when required.

The responsibility for the design and construction of the support foundation and tank is with end user. The foundation must be adequate to withstand normal operating loads and possible overloads while maintaining alignment to attached system components under such loads.

An engineered structural steel foundation should be designed to provide adequate rigidity and prevent loads from distorting the housing or cause misalignment of internal gears and shafts.

When flange-mounting the mixer, the bulk head plate must be engineered to minimize buckling distortions and support the cantilevered weight of the mixer.

If a concrete foundation is used, allow the concrete to set firmly before bolting down the mixer. Grout structural steel mounting pads and bolts of sufficient size into the concrete to adequately distribute the load stress onto the concrete foundation.

The mixer must be mounted in the designed position in order to stay properly lubricated. Consult Cleveland Mixer before making any changes to the mixer or mounting position.

PRE INSTALLATION CHECK

- Mixers are unpacked and all parts are accounted for
- The installation site meets requirements listed above
- A professional is onsite with the correct equipment to safely and securely lift the mixer and it's components into position
- A professional electrician is onsite to wire the motor/drive
- You have all the necessary tools to install the mixer including a torque wrench (reducer hardware will be metric)
- You've read through the O&M manual for the mixer, the manual for the motor and manuals for mechanical seal or speed drive (if applicable).
- The tank is empty, clean and you have access to work inside to install impellers.
- (if your mixer was supplied with a steady bearing assembly) Your steady bearing tripod has been laser aligned with the mixer shaft and welded in it's designated location.

FASTENERS

- Tighten all fasteners to the values shown unless specifically instructed to do otherwise.
- Lubricate all fasteners at assembly with grease, oil or anti-seize material
- If fasteners cannot be lubricated, use dry torque spec provided on chart.
- Loose hardware can cause catastrophic damage. It is very important to check all fasteners at scheduled maintenance intervals.
- If your process is corrosive or sanitary check the wetted hardware to make sure it is the correct grade before assembly.
- Always use washers and lock washers if they were provided.

USA Standard	GRADE 5		GRADE 8		316 STAINLESS STEEL	
THREAD SIZE	FT LB DRY	FT LB LUBED	FT LB DRY	FT LB LUBED	FT LB DRY	FT LB LUBED
1/4-20	8	6.3	12	9	6	5
5/16-18	17	13	24	18	11	10
3/8-16	30	23	45	35	20	17
7/16-14	50	35	70	50	33	28
1/2-13	75	55	110	80	45	38
9/16-12	110	80	150	110	59	50
5/8-11	150	110	210	160	96	82
3/4-10	260	200	380	280	131	111
7/8-9	430	320	600	450	202	172
1-8	640	480	910	680	299	254

Calculated tightening torques are based on conventional 60°F, clean and dry or lubricated (as indicated above) thread. Standard fasteners will be supplied with a split lock washer. Cleveland Mixer recommends a minimum of grade 5 (ASTM A449) for all hardware to 1-8 and grade SAE 8 for larger sizes.

REDUCER LUBRICATION

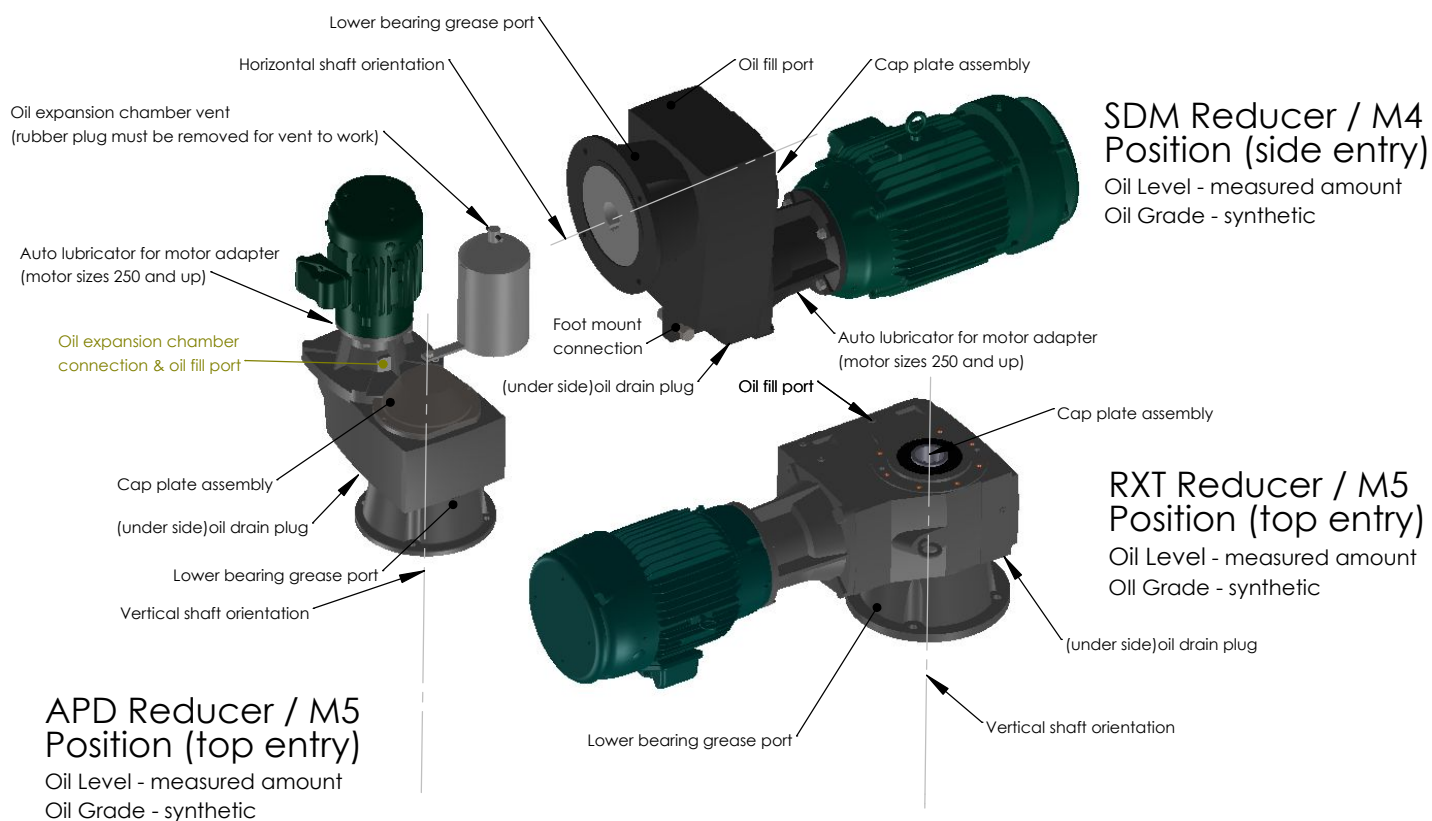
Proper gearbox lubrication is essential in order to reducer friction, heat and moisture. Lubricants reduce heat and wear by inserting a protective "fluid boundary" between mating parts and preventing direct metal to metal contact. Lubricants also help prevent corrosion and oxidation, minimize foaming, improve heat transfer, optimize reducer efficiency, absorb shock loads and reduce noise.

Most reducers used with Cleveland Mixers are shipped from the factory with a pre-determined oil fill level in accordance to the specified reducer size and mounting position.

Cleveland Mixer recommends an oil change 3 months after startup to flush the gear case of any debris caused by the reducer's wear-in period. Drain the oil from the reducer, take a look to make sure the oil looks clean and clear (If the original oil is foamy and burnt looking or has chunks of metal in it, please contact the factory for assistance). Refill the reducer with the specified measured amount of the specified oil (typical Mobil SHC 630 series). **Once the original oil is changed out, Cleveland Mixer recommends changing the oil and adding grease to the bearings once per year for the life of the mixer.**

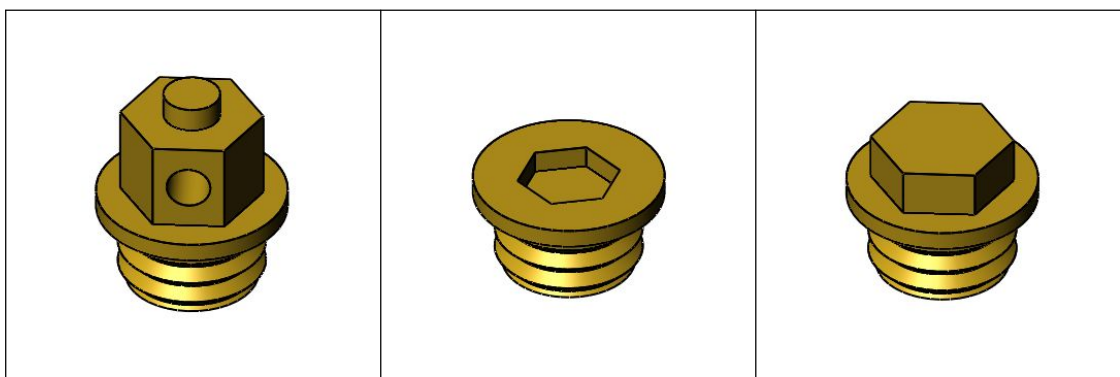
Oil viscosity, or the oil's resistance to shear under load, is often considered the single most important property of any gear oil. You might consider making a change to the oil viscosity to improve performance when operating the mixer in an extremely low or high temperature. **The oil supplied with the mixer from the factory is rated for use with an ambient temperature range of 31°F-176°F. To prevent the reducer from overheating, the internal temperature of the reducer should never exceed 220°F.**

Routine oil analysis, sound lubrication practices and good tracking of oil performance trends will help extend the life of your reducer and maximize the workload performance of your mixer. **APD units size 4 and up will come with an oil overflow canister which must be installed.** The canister needs to be upright with the hose down toward the reducer. the canister will have a rubber plug in the breather pin which must be removed before operating.



RXT, APD & SDM STANDARD MOUNTING POSITIONS
consult factory for mounting positions not shown, for top/angle mounted units use M5

PLUGS



AUTO VENT

(MUST BE OPENED BEFORE OPERATING)

DRAIN PLUG

FILL LEVEL PLUG

COMMISSIONING

Prior to mixer start-up, complete the following:

- Check the lubricant and be sure that the gear unit is filled with the proper oil type, to the proper level, as determined by the mounting position (this info will also be indicated on the mixer's ID tag).
- Check to make sure all breather vents are open
- Check to make sure the oil expansion chamber (if one was provided) is installed correctly.
- All mounting hardware is torqued to the appropriate value (not torqueing the bolts can create an unbalance).
- If a mechanical seal is required, the seal was installed/set according to the manufacturer's requirements, the shipping clips are removed, the seal has lubrication (if it's not a dry running seal), the seal has been pressure tested.
- The motor is wired to run in the correct direction with the appropriate voltage and needed amperage to run the motor.
- The shaft and impeller assemblies are properly installed. If a steady bearing was supplied, the SB was laser aligned with the reducer output after the reducer was mounted on the tank. The shaft should be straight to .001" per inch.
- The mixer has been test bumped before entering into normal operation.

LONG TERM STORAGE

- Store the reducer in its designed mounting position in accordance with the specified oil-fill level in a clean, dry environment. Avoid temperature fluctuations within the range of 32°F - 104°F and relative humidity conditions in excess of 60%.
- Keep shaft sections level and flat, preferably crated to avoid warping and scoring the metal. Coat the shaft, impellers, hubs, keys, couplings (any metal parts) etc. with grease to prevent rust and corrosion.

(continued on next page)



LONG TERM STORAGE

(continued from previous page)

- Store the mixer in an area away from shock and vibration.
- Once every 2-3 months, rotate the output shaft 10-20 revolutions to keep the gears and bearings drying out and seizing up.
- Avoid direct exposure to the sun or UV light and aggressive or corrosive materials in the environment.
- Drain the oil and refill the reducer with fresh oil before putting the mixer back into operation.
- Your mixers motor will come supplied with it's own set of operating and maintenance instructions. Please follow those instructions for long term storage of the motor.
- If your mixer requires a mechanical seal, drive unit or any other components supplied with a separate manufacturers operation and maintenance manual, please follow those instructions for long term storage of those components.

OIL FILL QUANTITY, MODEL SDM - SIDE ENTRY

MIXER MODEL	UNIT OF MEASURE	FILL QUANTITY
SDM-2	QUARTS	2.01
	LITERS	1.90
SDM-3	QUARTS	3.44
	LITERS	3.25
SDM-4	QUARTS	5.02
	LITERS	4.75
SDM-5	QUARTS	7.93.
	LITERS	7.50
SDM-6	QUARTS	12.68
	LITERS	12.00
SDM-7	QUARTS	21.24
	LITERS	20.00
SDM-8	QUARTS	31.71
	LITERS	30.00

NOTE: SDM units do not require the use of an oil expansion chamber. The breather plug must be positioned above the oil fill line. Cleveland recommends changing the oil once per year.



OIL FILL QUANTITY, MODEL APD - TOP ENTRY

MIXER MODEL	UNIT OF MEASURE	FILL QUANTITY
APD-1	QUARTS	1.27
	LITERS	1.20
APD-2	QUARTS	2.11
	LITERS	2.00
APD-3	QUARTS	4.33
	LITERS	4.10
APD-4	QUARTS	5.71
	LITERS	5.40
APD-5	QUARTS	9.30
	LITERS	8.80
APD-6	QUARTS	18.50
	LITERS	17.50
APD-7	QUARTS	28.50
	LITERS	27.00
APD-8	QUARTS	43.30
	LITERS	41.00
APD-9	QUARTS	76.10
	LITERS	72.00

NOTE: APD units size 4 and up require the use of an oil expansion chamber. The chamber must be installed above the oil fill level with the hose side down to allow the chamber to drain back into the reducer.

The fill quantities listed above are for APD double reduction gear reducers. If you have a triple reduction unit (typical for sizes 8 and up) contact the factory for oil fill quantities, this info will also be stamped on the mixer's ID tag.

Cleveland Mixer recommends changing the oil once per year. Any unit with a 250 series motor frame and up will require an autolubricator for the motor input bearing. The canister must be replaced once per year.



OIL FILL QUANTITY, MODEL RXT - TOP ENTRY

MIXER MODEL	UNIT OF MEASURE	FILL QUANTITY
RXT-1	QUARTS	1.27
	LITERS	1.20
RXT-2	QUARTS	2.43
	LITERS	2.30
RXT-3	QUARTS	3.49
	LITERS	3.30
RXT-4	QUARTS	6.87
	LITERS	6.50
RXT-5	QUARTS	12.2
	LITERS	11.5
RXT-6	QUARTS	20.1
	LITERS	19.0
RXT-7	QUARTS	20.1
	LITERS	19.0
RXT-8	QUARTS	40.2
	LITERS	38.0
RXT-9	QUARTS	87.0
	LITERS	82.0

NOTE: RXT units do not require the use of an oil expansion chamber. These are top entry angled, helical bevel units. The other mixers in this series are vertical helical units.

The fill quantities listed above are for RXT double reduction gear reducers. If you have a triple reduction unit (typical for sizes 8 and up) contact the factory for oil fill quantities, this info will also be stamped on the mixer's ID tag.

Cleveland Mixer recommends changing the oil once per year.



LUBRICATION APPROVED OILS CHART

ISO VISCOSITY	OIL TYPE	AMBIENT TEMP RANGE	MOBIL	SHELL	CASTROL	FUCHS	KLUBER LUBRICATION
VG150	PAO-EP	-22 to 77°F	Mobilgear SHC150	Omala HD150	Alphasyn EP150	Gearmaster SYN150/NA	Klubersynth EG4-150
	PAO	-22 to 77°F	MOBIL SHC 629	Omala RL150	Alphasyn 150	NA	Klubersynth GEM4-150N
	FG-PAO	5 to 77°F	MOBIL SHC CIBUS 150	NA	NA	Cassida GL150	Klubersoil 4 UH 1-150N
VG220	PAO-EP	-22 to 140°F	Mobilgear SHC220	Omala HD220	Alphasyn EP220	Gearmaster SYN220/NA	Klubersynth EG4-220
	PAO	-22 to 140°F	MOBIL SHC 630	Omala RL220	Alphasyn T220	NA	Klubersynth GEM4-220N
	FG-PAO	-13 to 140°F	MOBIL SHC CIBUS 220	NA	NA	Cassida GL220	Klubersoil 4 UH 1-220N
VG460	PAO-EP	-4 to 176°F	Mobilgear SHC460	Omala HD460	Alphasyn EP460	Gearmaster SYN460/NA	Klubersynth EG4-460
	PAO	-4 to 176°F	MOBIL SHC 634	Omala RL460	Alphasyn T460	NA	Klubersynth GEM4-460N
	FG-PAO	-4 to 176°F	MOBIL SHC CIBUS 460	NA	NA	Cassida GL460	Klubersoil 4 UH 1-460N

LUBRICATION APPROVED GREASE CHART

NLGI GRADE	GREASE TYPE	AMBIENT TEMP	MFG BRAND
NLGI GRADE 2	STANDARD	-30 to 140°F	Mobil Grease XHP222
	HIGH TEMP	-40-176°F	Mobil Polyrex EP 2
	FOOD GRADE	-22-104°F	Mobil SHC Polyrex 222

LUBRICATION NOTES

1. Food grade lubricants must be in compliance with FDA 212 CFR 178.3570 and qualify as a NSF-H1 lubricant. Please consult with lubrication manufacturer for more information.
2. When making a lubrication change, check with the lubrication supplier to assure compatibility and to obtain recommended cleaning or flushing procedures.
3. Do not mix different oils with different additive packages or different base oil formulation types. Polyglycol (PG) oils are not miscible with other oil types and never be mixed with mineral oil or polyphaolefin (PAO) synthetic oil.

PAO-EP (synthetic polyalphaolefin oil w/ EP additive)
 PAO (synthetic polyalphaolefin oil)
 FG-PAO (food grade polyalphaolefin oil)

ASSEMBLY OF TOP ENTRY MIXERS

The RXT and APD models are mixers that mount to the top of a tank, possibly by a flange connection to the tank nozzle or suspended on beams above an open top tank.

All RXT and APD models are designed and built custom to the requirements of each individual process. It's possible the mixer you are installing will look different or have additional or fewer components than what is shown in this manual. This manual covers basic installation of our most common designs.

The size of your mixer is directly effected by the tank volume, tank shape, desired level of agitation and fluid viscosity. Some mixers are supplied with a single direct input mixing shaft and single impeller while other larger agitator set ups come with multiple shaft sections, multiple impellers, steady bearings assemblies, etc. You can refer to your approval drawing for the specifics of your agitator.

The following steps must be completed in order to make sure your top mounted mixer is assembled correctly:

Helical gearing w/
vertical mounted motor

APD UNIT
TOP MOUNT

Vertical shaft

Down pumping impellers

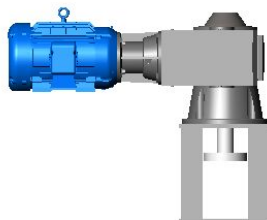
RXT UNIT
TOP MOUNT



Helical bevel
gearing w/
horizontal
mounted
motor

Vertical shaft

Down pumping impellers



Your drive unit (reducer, motor, stub shaft and HS couplings) will (typically) come preassembled from the factory. It is ok to leave it assembled as you assemble the rest of the mixer to it. Make sure to have all of your hardware and tools handy for connecting the mixer sections together. Torque all the bolts to the required values to help keep the components aligned.



Seals are the most delicate components in the installation of an agitator. It's very important that if you have a mechanical seal, to follow the manufacturers installation instructions (provided or available online). Do not rest weight on the seal, do not suspend any of the mixer's from the seal and don't bang the seal around. Seals have many small, delicate inner workings that can be easily damaged.

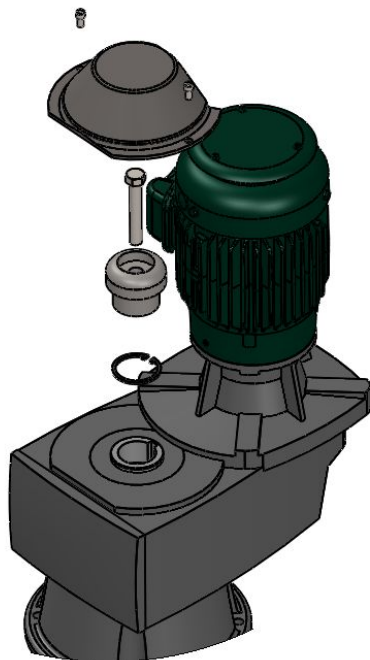
It's good to get measurements of the area around the mixer and shaft sections to create an installation plan prior to starting installation. Shaft sections can be long and heavy. It works best to get them staged in the tank prior to installing your drive unit. The use of a shaft catcher to suspend the weight of the shaft while lowering your drive down can be a helpful aid in installation.



Multiple impellers assemblies shown. These can be installed last once the drive end and shafting are secured in place.

Be careful when assembling the impellers. Once the tank is filled and the impellers are submerged it's not easy to get back to these to make adjustments.



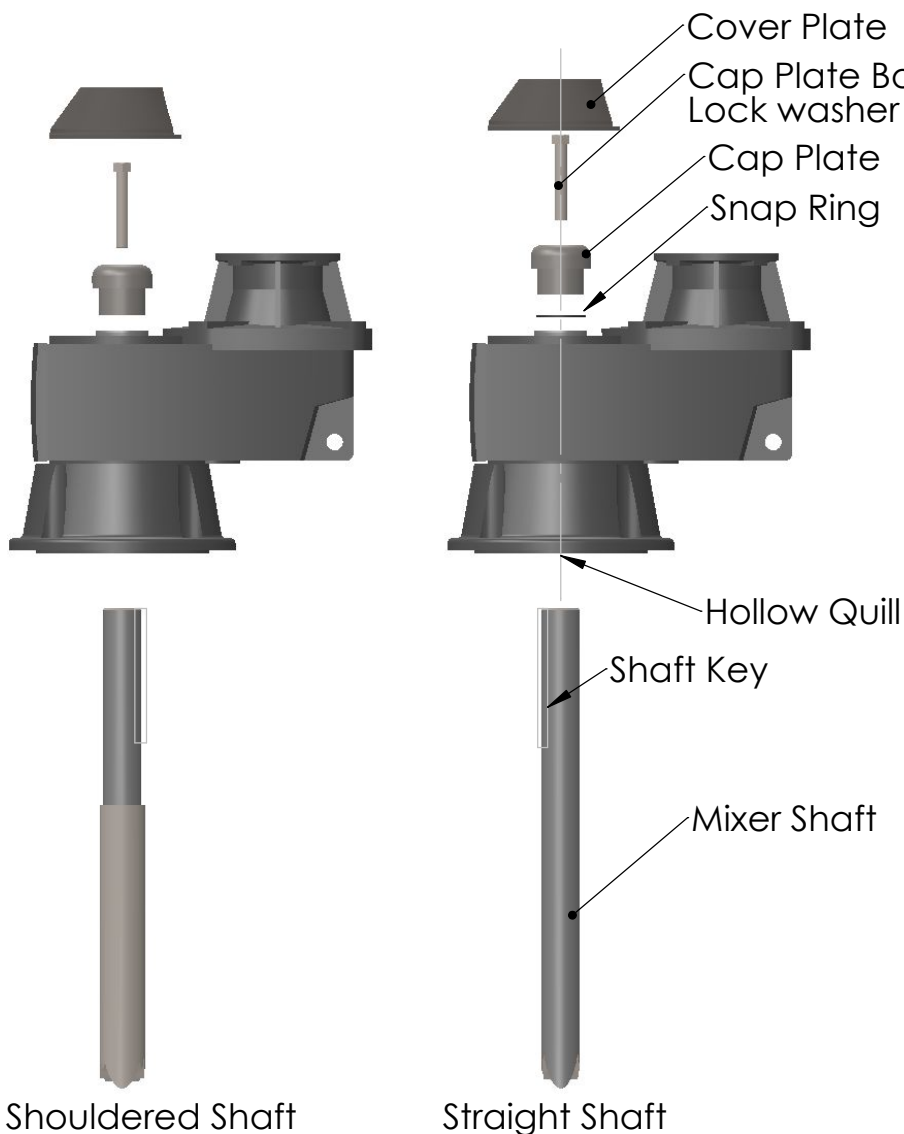


ASSEMBLING THE SHAFT FIXING ELEMENT

For RXT, APD and SDM models with a hollow output shaft, a fixing element kit will be supplied with your mixer. This kit will include a cover plate w/ hardware, a cap plate with a lock washer and bolt, a plastic bore cap, shaft key and a snap ring (not supplied with some units).

Your mixer will have one of the following configurations:

1. A straight shaft, a shaft with a single diameter from end to end. This is the shaft that will require a snap ring installed in the groove towards the top of the shaft quill. This snap ring will prevent the shaft from sliding up through the shaft quill from the thrust of the mixer.
2. A shouldered shaft, a shaft with a step that will sit just below the lower slow speed seal of the reducer. This shoulder fills the role of the snap ring used on the straight shaft.
3. A stub shaft, this shaft might be shouldered or straight. It's a short shaft with a coupling a longer shaft will connect to.

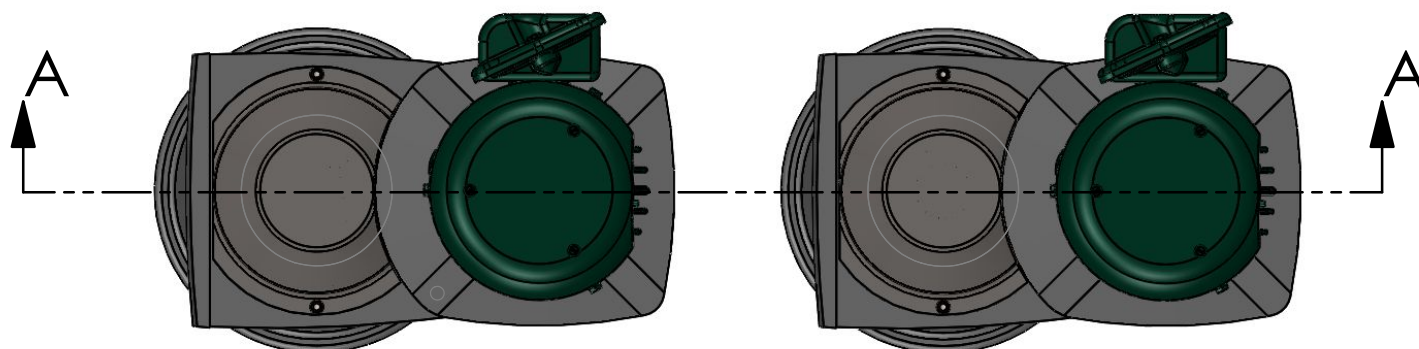
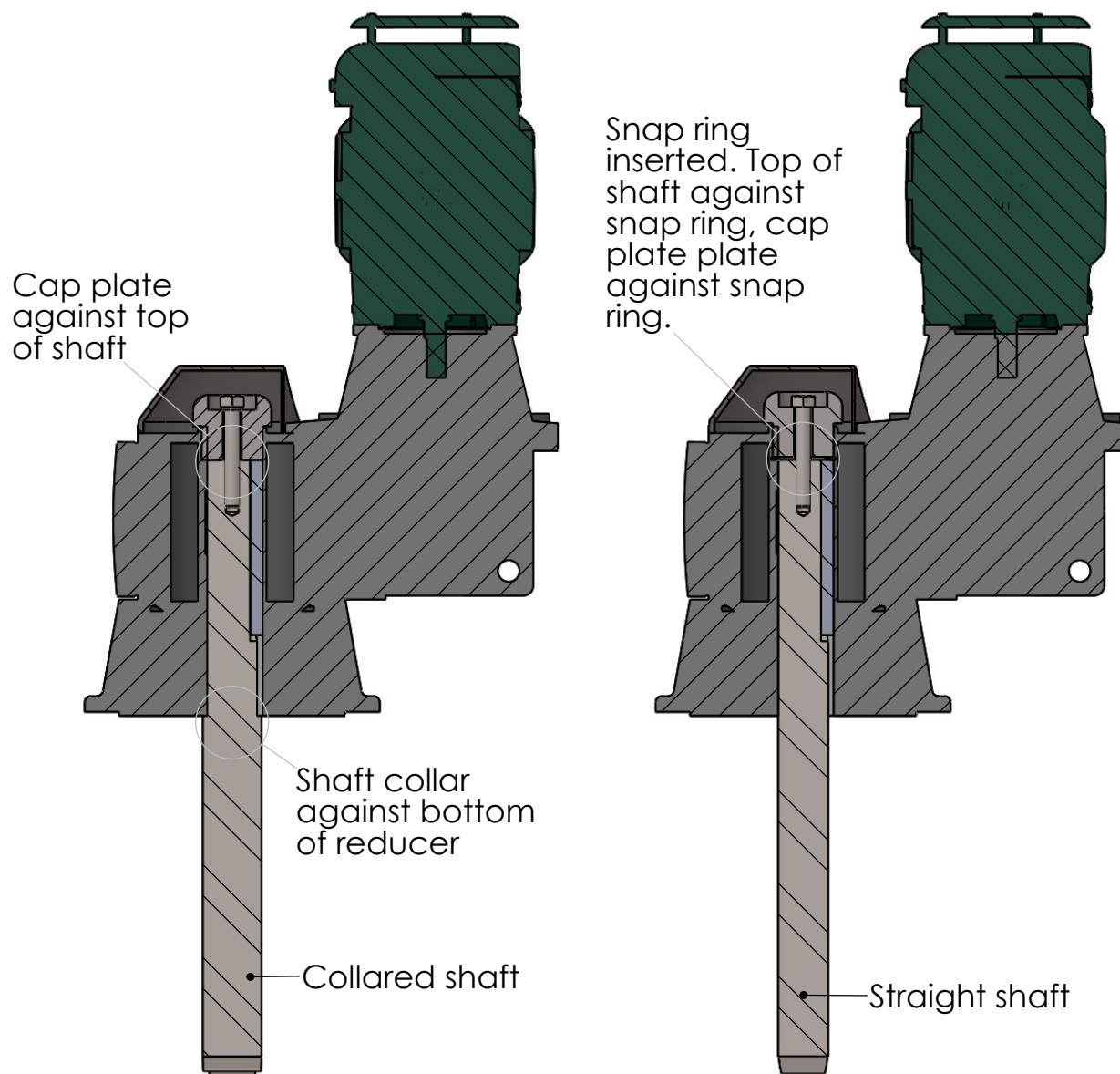


Assembly:

1. Slide shaft up into the hollow shaft quill in the reducer from the bottom of the reducer. Keep the key slots lined up.
2. Insert shaft key thru the shaft quill at the top of the reducer. so it aligns with the top of the shaft
3. If you have a shaft that requires a snap ring, insert the ring into the snap ring groove inside the shaft quill. The snap ring will sit at the top of the shaft.
4. Insert the cap plate at the top of the quill, use the lock washer and bolt supplied to lock the assembly together. Torque the shaft bolt.
5. Install the cover cap and cover plate.

SECTION VIEW - REDUCER SHAFT ASSEMBLY

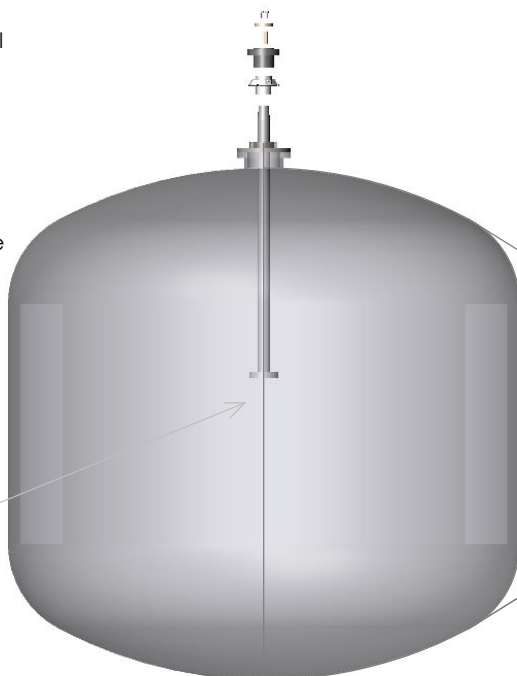
Before inserting your mixer shaft into your gear reducer, Cleveland Mixer recommends applying a lubrication compound to the insertion portion of the shaft, such as Anti-Seize, to prevent the shaft from galling up and getting stuck inside the hollow shaft. Never force or hammer the shaft into the quill, the shaft is factory fit to the reducer and should slide in without force.



Cleveland Mixer
A Brand of Sweeney, Inc.

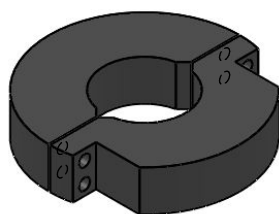
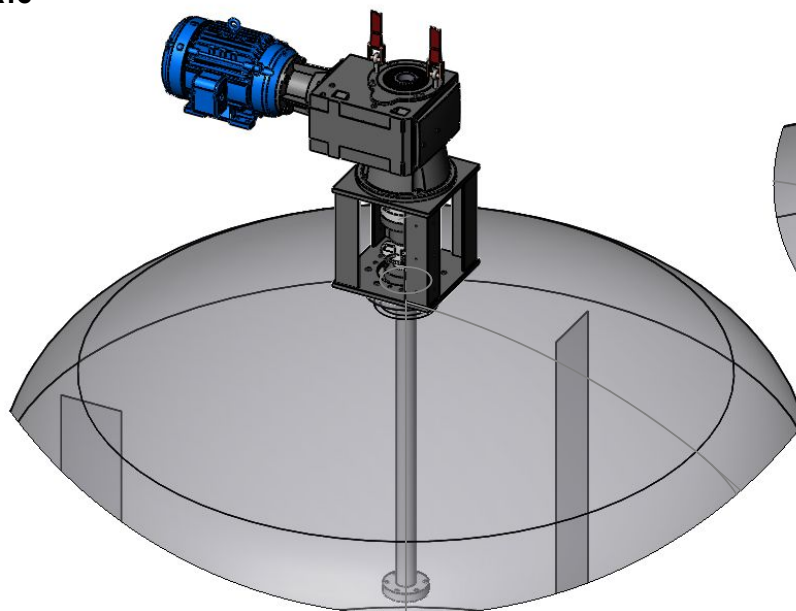
4 Heritage Park Rd.
Clinton, CT 06443
USA
Tel: 860-669-1199
Fax: 860-243-1111
www.clevelandmixer.com
Tel: 860-669-7461

When preparing to install your mixer on your tank, take a moment to gather all of the assembly parts and tools you'll need. Once the mixer and shaft(s) are suspended, it will be difficult and possibly dangerous to halt the assembly procedure. It's best to have a complete plan and all parts accounted for before beginning the process and raising the mixer components off the ground.



LOWER SHAFT PARTS

The lower shaft components such as lower and intermediate shaft sections, hubs and blades should be staged inside the tank prior to installing the mixer. If the lower and intermediate shaft sections are too large and heavy to lift without a crane, you might need to construct scaffolding inside of the tank to support their weight.



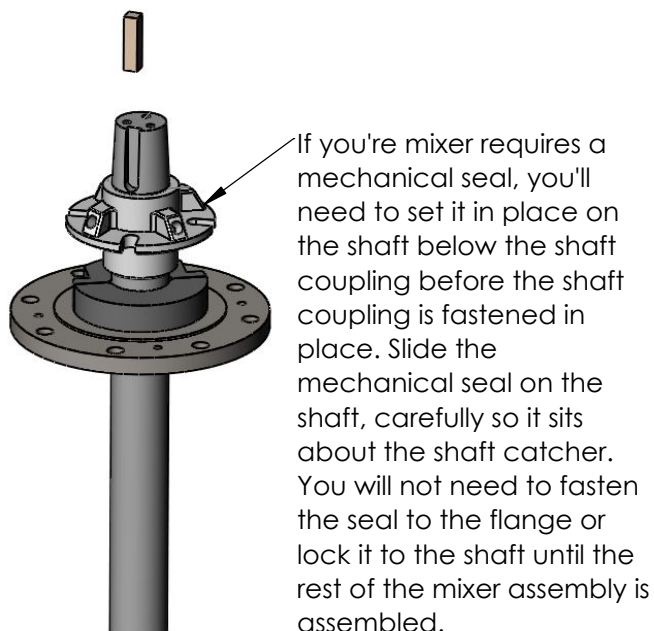
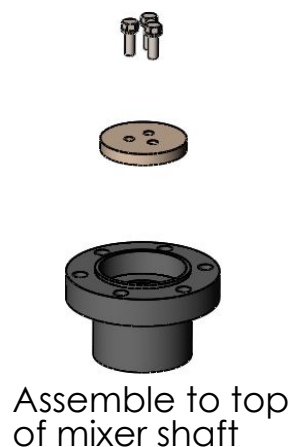
SHAFT CATCHER

The Cleveland Mixer shaft catcher is a two piece split collar that tensions around the shaft by tightening down on the 4 cap bolts to lock the catcher in place. Once tightened around the shaft, the catcher should be able to support the weight of the shaft (only). It is not designed to support additional weight of impellers or multiple shaft sections. You might not have been supplied with your order. It is a separate component designed to aid in installation of shafts for top entry mixers. If you need a shaft catcher for installation, please contact Cleveland Mixer to order.

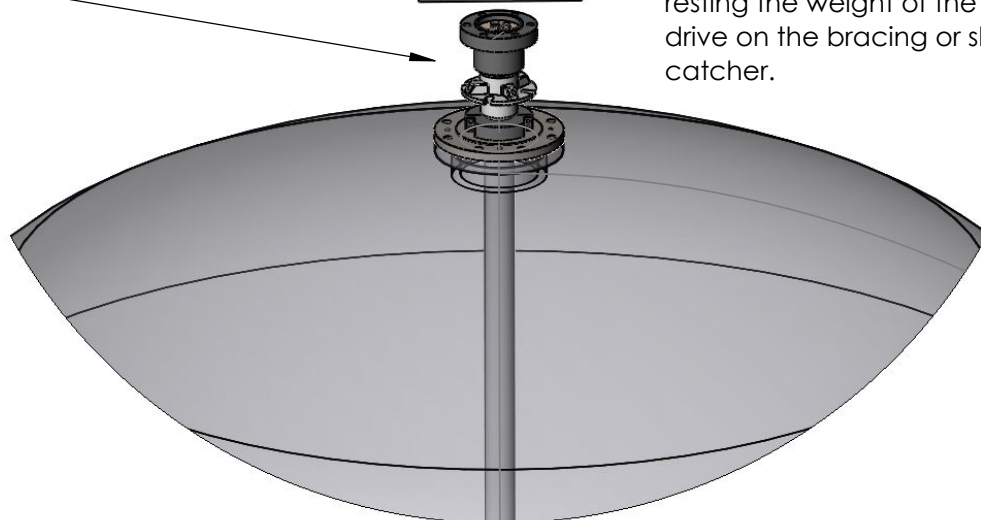


STEP 1 - (detail page 11) Use the mixer mounting flange with a shaft catcher (or your own bracing) to suspend the weight of the mixer shaft. Assemble the shaft coupling to the mixer shaft (make sure to torque and use thread locker on the cap plate bolts). If there's a mechanical seal, lip seal or packing gland be sure these are in place (not yet locked down) under the shaft coupling before assembling the coupling.

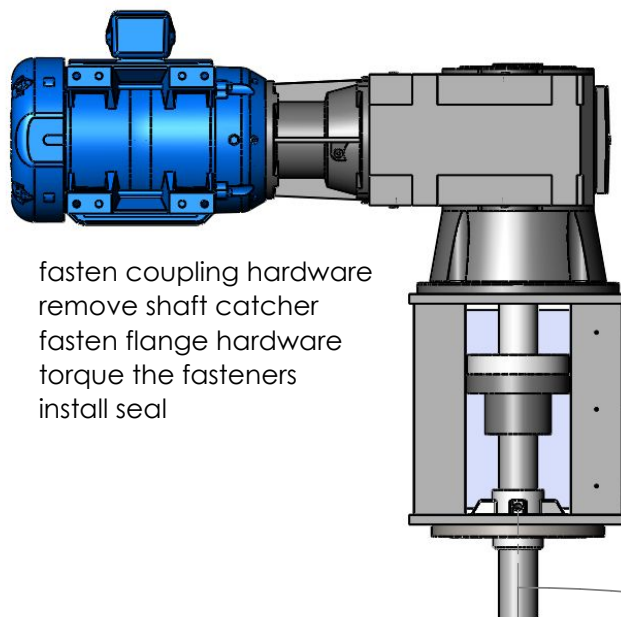
STEP 2 - The gear reducer, motor, pedestal and stub shaft will typically be shipped preassembled from the factory (if your is not, you will need to assemble these parts before completing this step) in step 2, use the appropriate lifting techniques to lift and lower the drive end of the mixer to mate with the mixer shaft or mixer shaft coupling. Use the fasteners supplied to make this connection before resting the weight of the drive on the bracing or shaft catcher.



TAPER BORE COUPLING



- fasten coupling hardware
- remove shaft catcher
- fasten flange hardware
- torque the fasteners
- install seal



MIXER DRIVE ASSEMBLED TO TANK FLANGE



Cleveland Mixer
A Board of Service, Inc.

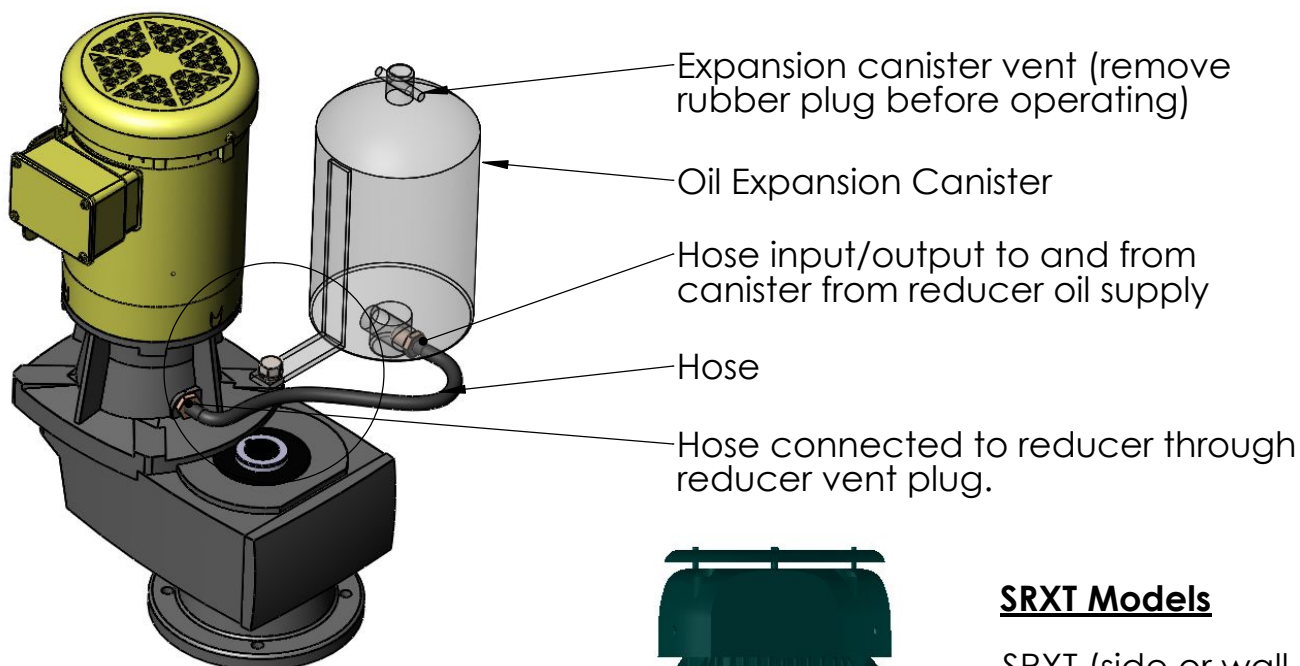
4 Heritage Park Rd.
Clinton, CT 06443
USA
Tel: 860-669-1199
Fax: 860-242-1111
www.clevelandmixer.com
Tel: 860-669-7461

Oil Expansion Chamber

APD units size 4 and up are supplied with an oil expansion chamber. With the motor mounted vertically and the gear case filled almost completely with oil in order to lubricate the 1st stage gearing, certain operating conditions can result in additional oil churning and heating of the air space above the oil resulting in oil loss. The oil expansion chamber provides a safe overflow area for the expanded oil-air mixture, thus eliminating excessive pressure build-up, minimizing the formation of foam and preventing oil-loss through the breather, oil seals, gaskets, etc.

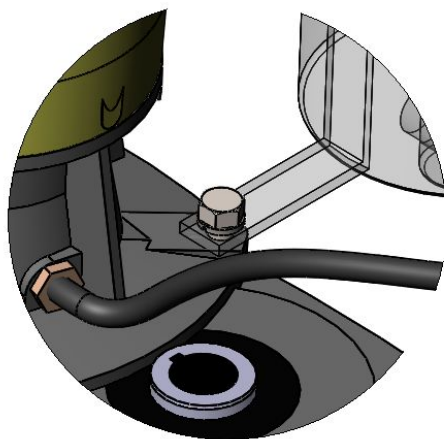
As heat is released from the expanded air-oil mixture contained within the overflow chamber, gravity allows the oil to be returned to primary gear sump supply, eliminating a critical loss of the oil level (the expansion chamber must be mounted above the oil fill line with the hose connected down towards the oil supply so the oil can flow back into the reducer naturally).

APD sizes 4 and up with vertical mounted motors



SRXT Models

SRXT (side or wall mounted) mixers with the motor mounted vertical must be run with an oil overflow chamber just as the APD units, sizes 4 and up. Mount the chamber using the motor adapter mounting hardware. Make sure the canister is up parallel to the motor with the hose towards the bottom connecting into the port, replacing the vent plug.



Connection Detail



Cleveland Mixer
A Brand of Sincor, Inc.

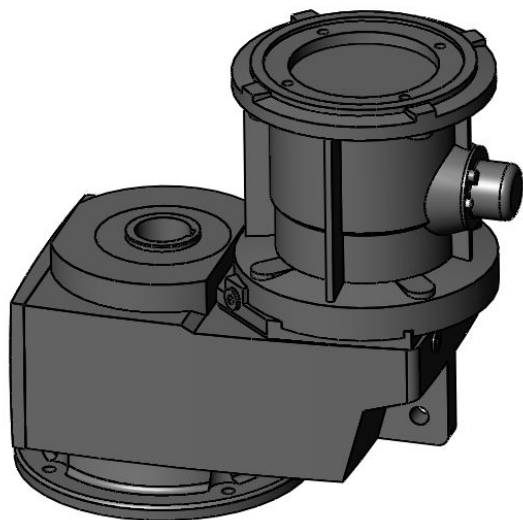
4 Heritage Park Rd.
Clermont, CT 06043
USA
Tel: 860-669-1119
Fax: 860-242-1111
www.clevelandmixer.com
Tel: 860-669-7861

AUTO LUBRICATOR ACTIVATION

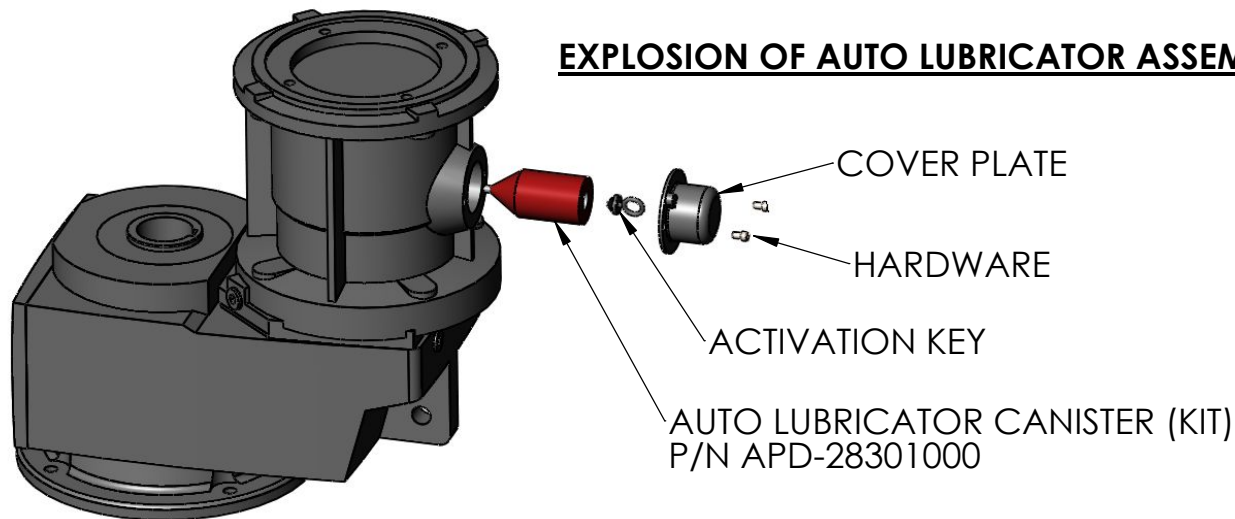
If you have an APD mixer model with a motor, frame size 250 or larger, the input adapter will require an auto-lubricator canister to lubricate the input adapter bearing.

Your mixer will come supplied with a canister factory installed. You'll need to activate the lubricator canister prior to starting the mixer.

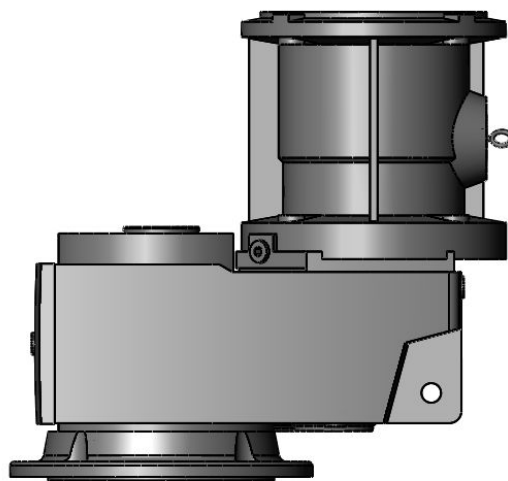
An auto-lubricator canister cartridge has a one year life span. After one year of use you will need to replace the canister. You can contact Cleveland Mixer for replacement canisters.



EXPLOSION OF AUTO LUBRICATOR ASSEMBLY



ACTIVATION KEY

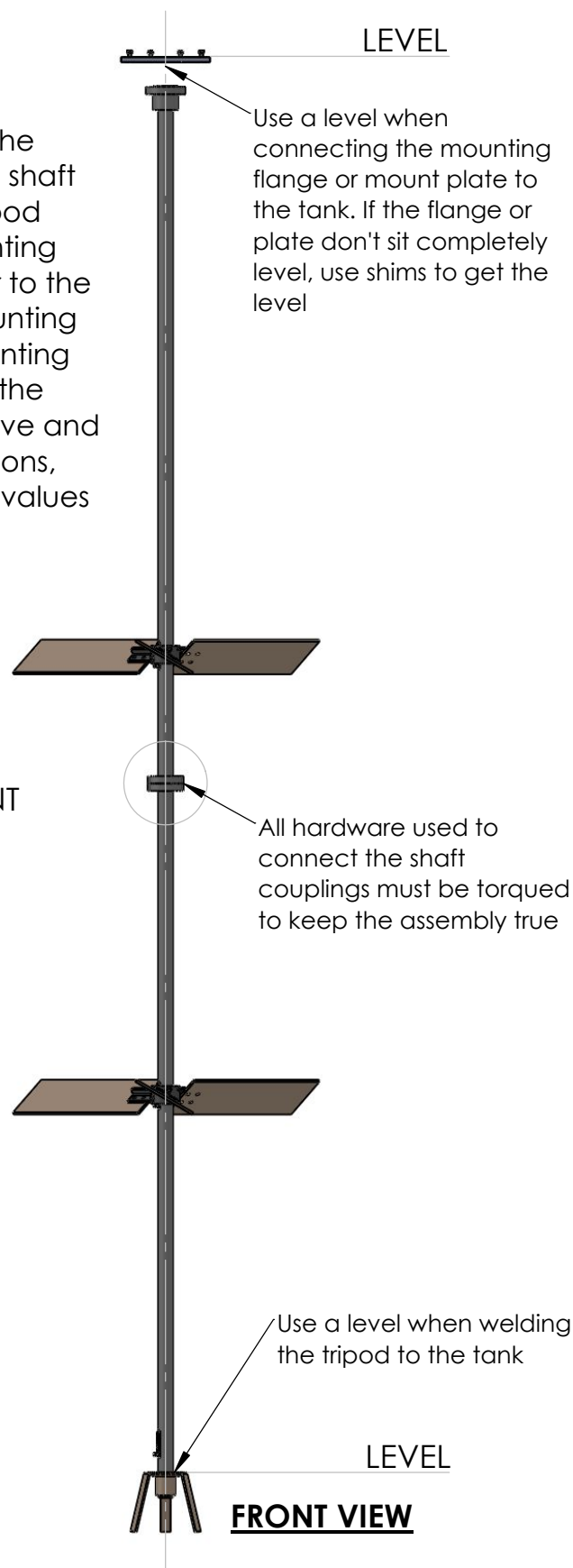
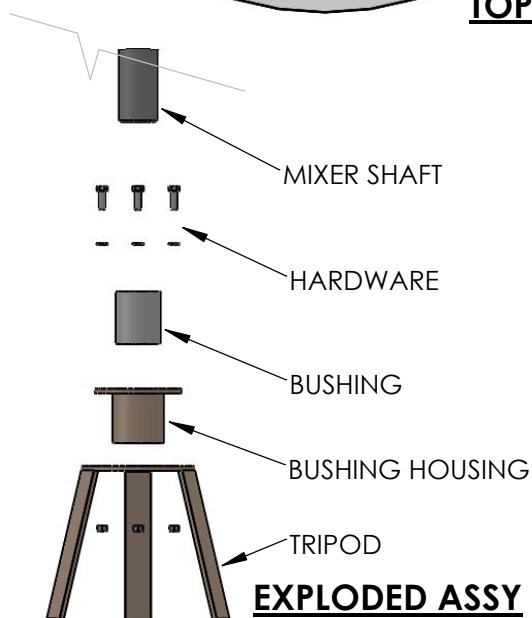
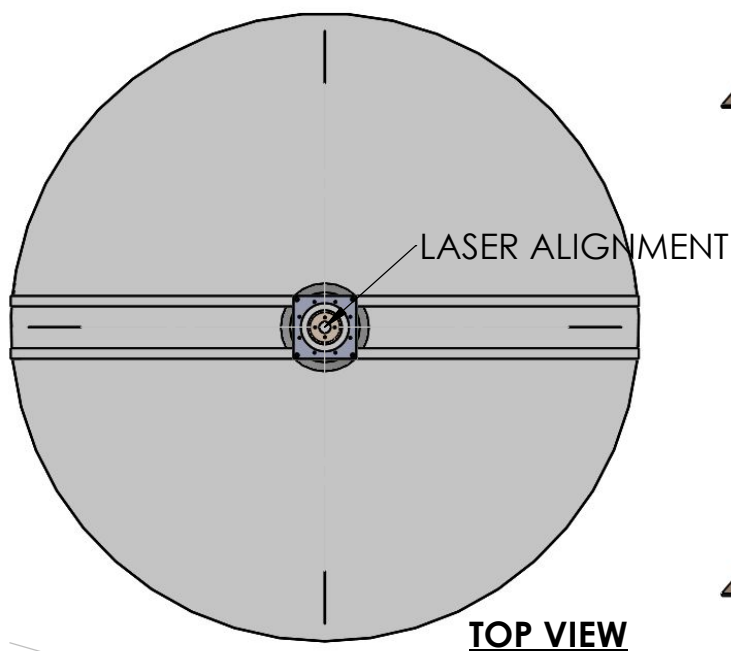


Prior to starting your mixer: screw in Auto-Lubricator activation key and turn it clockwise until the round plastic ring snaps off. It's a good idea to record the date of activation so you know when to replace the canister.

Once the canister is activated, replace the cover plate and secure it to the motor adapter.

STEADY BEARING ASSEMBLY

If your mixer was supplied with a steady bearing assembly, the tripod will need to be welded to the bottom center of the tank. The alignment of the shaft assembly is very important, the center of the tripod must be concentric with the center of the mounting flange or mount plate used to mount your mixer to the tank. Use a laser to align the tripod with the mounting fixture before welding, both the tripod and mounting fixture must sit level on the tank as shown. Weld the tripod in place prior to assembling your mixer drive and shaft assembly. When assembling the shaft sections, make sure to torque the coupling bolts with the values provided in this manual.



NOTE: Failure to properly align the mixer shaft with the tripod from the reducer output to the center of the tank could result in the following: accelerated wearing of the bushing, scoring and wear on the mixer shaft, damage to the tripod including tearing the tripod support welds off the tank which can lead to catastrophic failure.



PACKING GLANDS / STUFFING BOX

Cleveland Mixer stuffing box seals are supplied as either "high pressure" with 7 packing rings (the thickness of the packing is dictated by the shaft diameter) or "low pressure" with a single packing ring. High pressure stuffing box seals are typically supplied with mixers that are side wall mounted or mounted on a sealed tank with pressure over 30 PSI but less than 100 PSI. Low pressure stuffing box seals are typically supplied with mixers that are top mounted on sealed tanks with pressure of less than 30 PSI.

<PARA >1. Packing should always be installed as individual rings and not spiraled around the shaft.

2. Lubricate each ring generously with grease (food grade grease can be used with food grade packing in sanitary applications).

3. High pressure stuffing boxes have four packing rings, a lantern ring and then three packing rings on top. Once the gland is packed in that order, slide the split follower down to sit on top of the packing and snug the four nuts just so the split follower is touching the packing. The lower pressure is the same procedure but with the follower and one packing ring.

4. Pump the gland full of grease using the grease fitting on the side of the gland. You can pump grease into the gland until you see it push through the top. Once the gland is completely filled with grease, tighten the split follower nuts evenly until the gland is sealing properly. The seal is not created by tension from tightening the nuts, the seal is created by the grease in the packing against the mixer shaft. Over tightening the nuts and pushing the follower down on the packing can damage the mixer shaft.

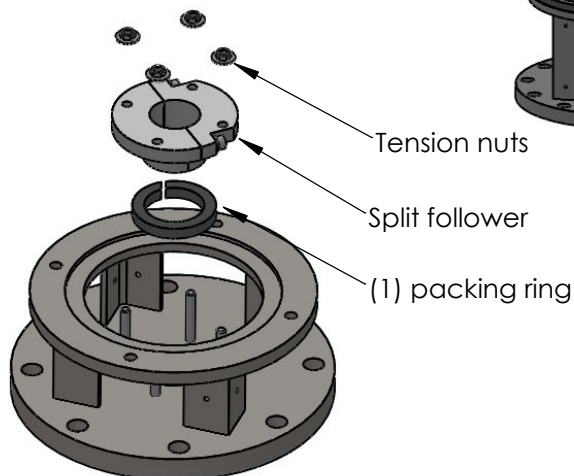
5. As the mixer runs and the gland wears in, you'll most likely need to add additional grease and possibly tighten down on the split follower nuts slowly and evenly in about 1/2 turn increments.

6. The gland will need to be greased as regularly as needed to keep the seal. This can vary based on the contents of the tank, the shaft RPM and amount of pressure on the seal.

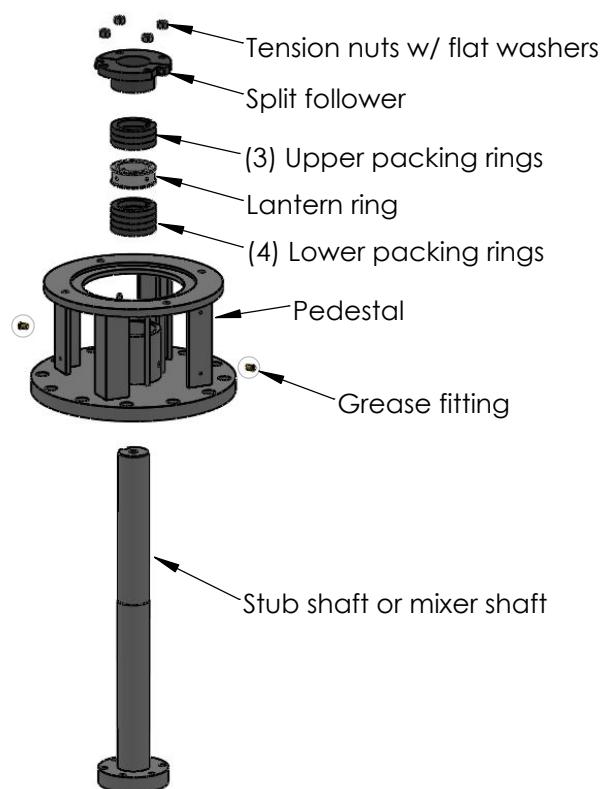
7. Remember to replace the pedestal guards and secure the guards back onto the pedestal once the packing gland is set up. You can add extensions to the grease fittings through the guards for ease of access for continued lubrication.

DRIVE END OF MIXER

"Low Pressure - 0-30 PSI"



"High Pressure - 30-100 PSI"



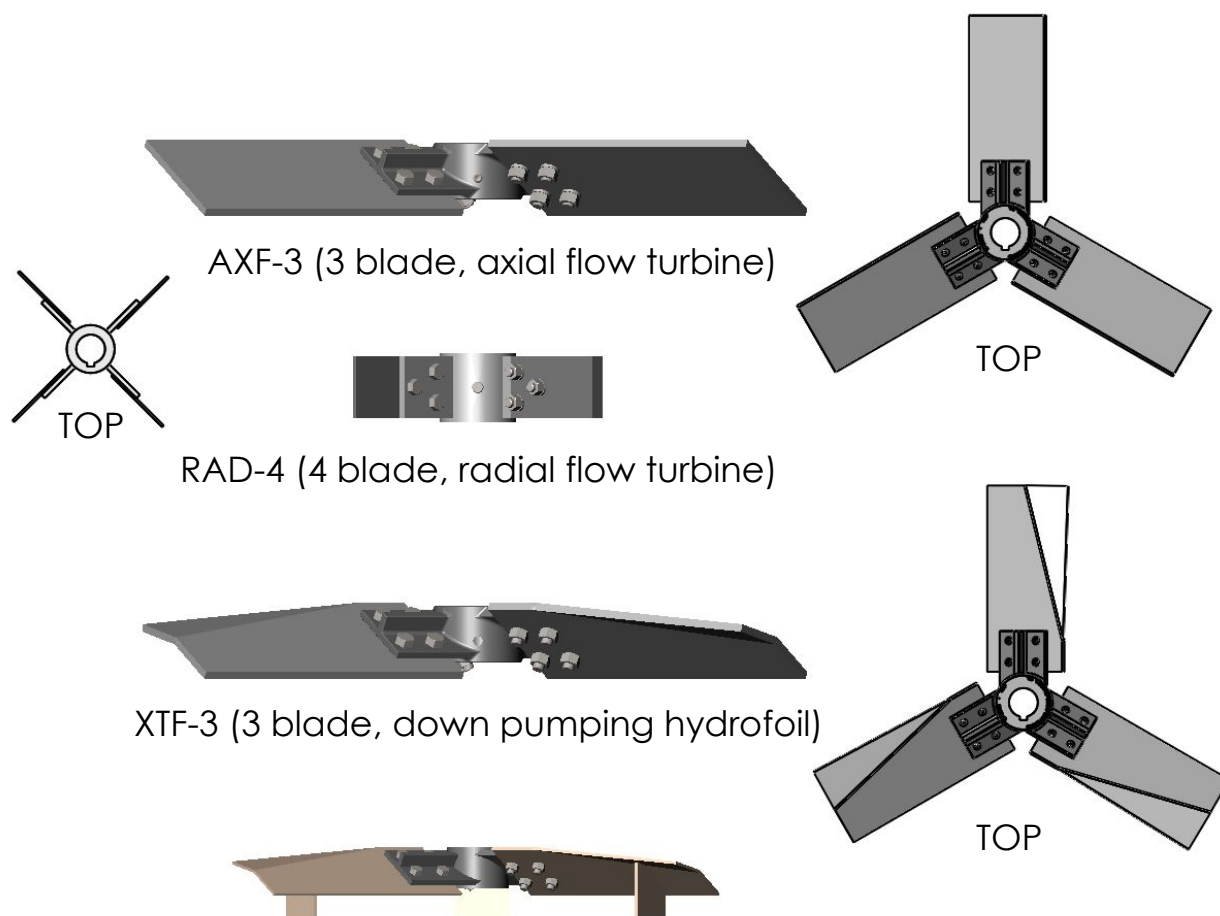
Impellers

Cleveland Mixer offers several different options for mixing impellers. The design of the impeller is typically based on the process specifications. Different types of mixing and different levels of agitation require different flow patterns and those flow patterns are created by the style of the impeller blades. The size and speed of the impeller along with the pitch of the blades will dictate the amount of power needed to turn them. The mixing power is a combination of the motor and gearbox ratings.

Most mixers are designed specifically to a single process. Cleveland Mixer does not recommend altering the process or the design of the mixer without first consulting the factory. Increasing the viscosity of the process media or increasing the output RPM's are common causes for impeller damage and overload failure.

The most common impeller designs provided by Cleveland Mixer:

1. **Hydrofoil** Impellers are axial thrust-giving elements. These elements give a very high degree of swirling in the vessel. The flow pattern generated in the fluid resembles a helix.
2. **Axial** flow turbines impose essentially bulk motion, and are used on homogenization processes, in which increased fluid volumetric flow rate is important.
3. **Radial** flow turbines impose essentially shear stress to the fluid, and are used, for example, to mix immiscible liquids or in general when there is a deformable interface to break. Another application of radial flow impellers are the mixing of very viscous fluids.



Some impellers will require stabilizer fins as shown on the left. If you have multiple impeller assemblies but only one set with stabilizers, the set with the stabilizers should be the set closest to the bottom of the tank (check your approval drawing to be sure). Make sure the blades are fastened to the hubs with the stabilizers side down.

Impellers, Shafts & Couplings

Once the drive end of your mixer is installed on the tank, it's time to connect your shaft couplings (if your mixer has multiple shaft sections) and assemble the impellers.

Before beginning this stage of the assembly, check to make sure you have all of the components, hardware and tools you'll need to correctly connect the shaft couplings and impeller assemblies. You can refer to your assembly approval drawing for a list of all of the parts associated with your mixer.

Cleveland Mixer recommends using thread locking compound on all connection hardware. A calibrated torque wrench is required to keep balance in the connections and to ensure the connection bolts are stretched and tightened so they won't come loose during operation.

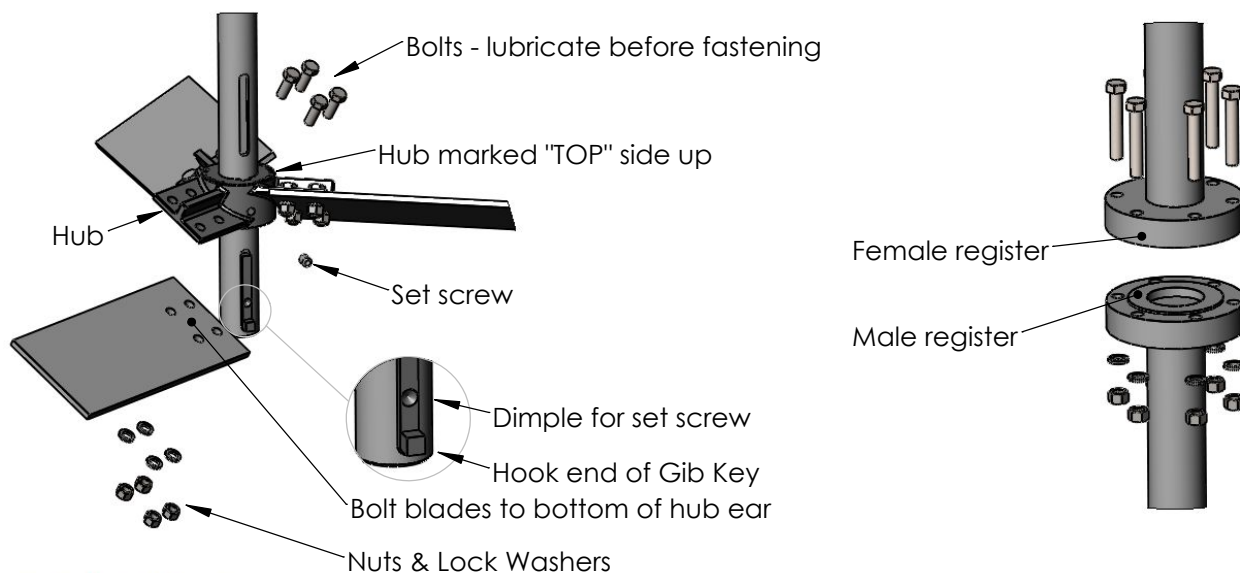
SHAFT COUPLINGS

1. Each shaft coupling connection will have a male and female register. Check these registers for dirt, dings and dents that might have accrued during shipment or staging of these components. For proper alignment, it's important these registers have a clean connection.
2. Once the registers are mated, insert the pre-lubricated connection bolts. Each set of hardware will include a bolt, split spring lock washer and a nut. You can check your assembly drawing for the wetted parts material of construction to make sure you're using the correct hardware. The hardware will be either 316L stainless steel or zinc. Stainless steel hardware should be used in sanitary or corrosive applications.
3. Add a few drops of thread locker and hand tighten the nuts to the lock washers. Use the torque chart from this manual to find the torque value for the size of the bolt. Torque the nuts down each of the nuts down to the same value to ensure proper alignment of the coupling connection.

IMPELLER ASSEMBLY

Assemble the impellers using the same procedure described above to tighten the connection hardware.

1. Check the center bore of the hub to make sure it's clean from dings, dents, scratches and dirt. The bore tolerance might be as close as $\pm .005$, you don't want to force the hub on the shaft. Forcing can cause it to gall up and get stuck on the shaft. Check the hub for the marking "TOP" make sure that side of the hub slides up towards the mixer drive. The hub should slide up the shaft nice and easy with minimal assistance beyond supporting its weight.
2. Starting with the top hub (if you have multiple impellers) slide the hub up over the key slot.
3. Insert the key into the key slot with the gib end down. You should be able to slide the hub down and let it rest on the key without a fastener.
4. Add a few drops of thread locking compound or fastener lubricant and torque the set screw to the key. The set screw should line up with a dimple in the center of the key.
5. Fasten the blades to the bottom of the hub ears. Blades with stabilizer fins should have the fin side down. Double check this assembly before operating the mixer. Operating the mixer with the blades or hubs on backwards or upside down can cause catastrophic damage to the mixer.

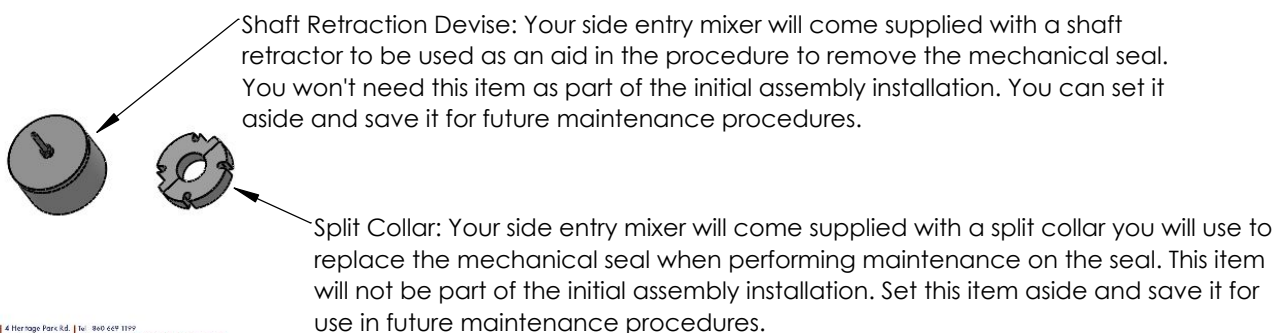
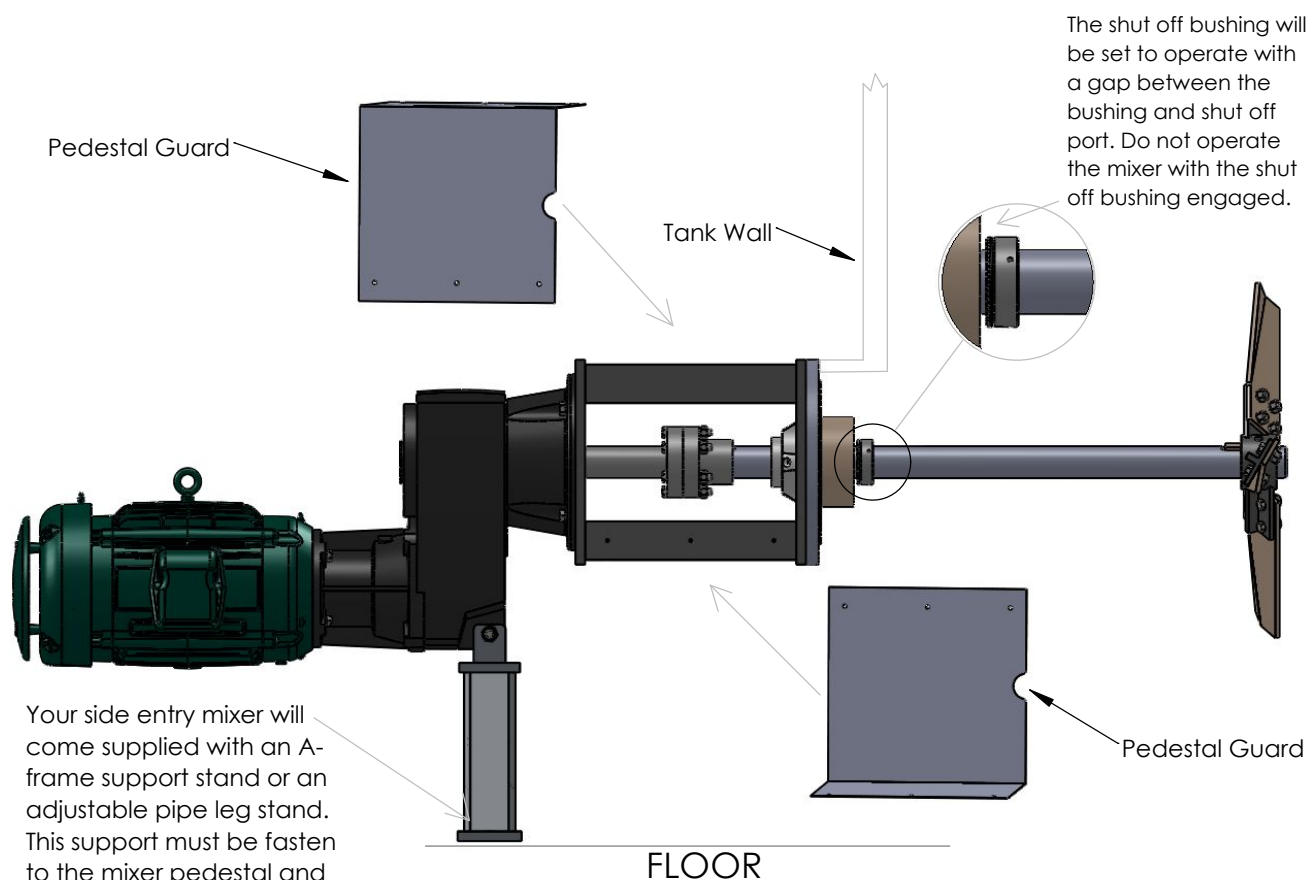


SIDE ENTRY

Sealed, flange mounted mixers that mount to the tank with the mixing shaft horizontally are known as "Side Entry" mixers. This includes Cleveland's models: SDM, SDS, SRXTM and SRXTS. The first "S" represents side entry, then the model number and the last letter in the name, either S or M represents "M" for mechanical seal and "S" for packing gland.

Before mounting the mixer you will need to check the following: (1) The tank walls and tank nozzle construction are strong enough to support the weight of the mixer and the forces the mixer will produce. (2) The tank nozzle flange matches the mixer's mounting flange. (3) The tank nozzle is angled to the requirements of the assembly drawing (typically 7-10° angle). (4) The ground/floor beneath the mixer is concrete or of equal rigidity to support the weight of the mixer with the mixer support stand. (5) If your mixer seal requires a seal flush (most double mechanical seals will require a flush) you have the necessary fluid or gas piped to the seal.

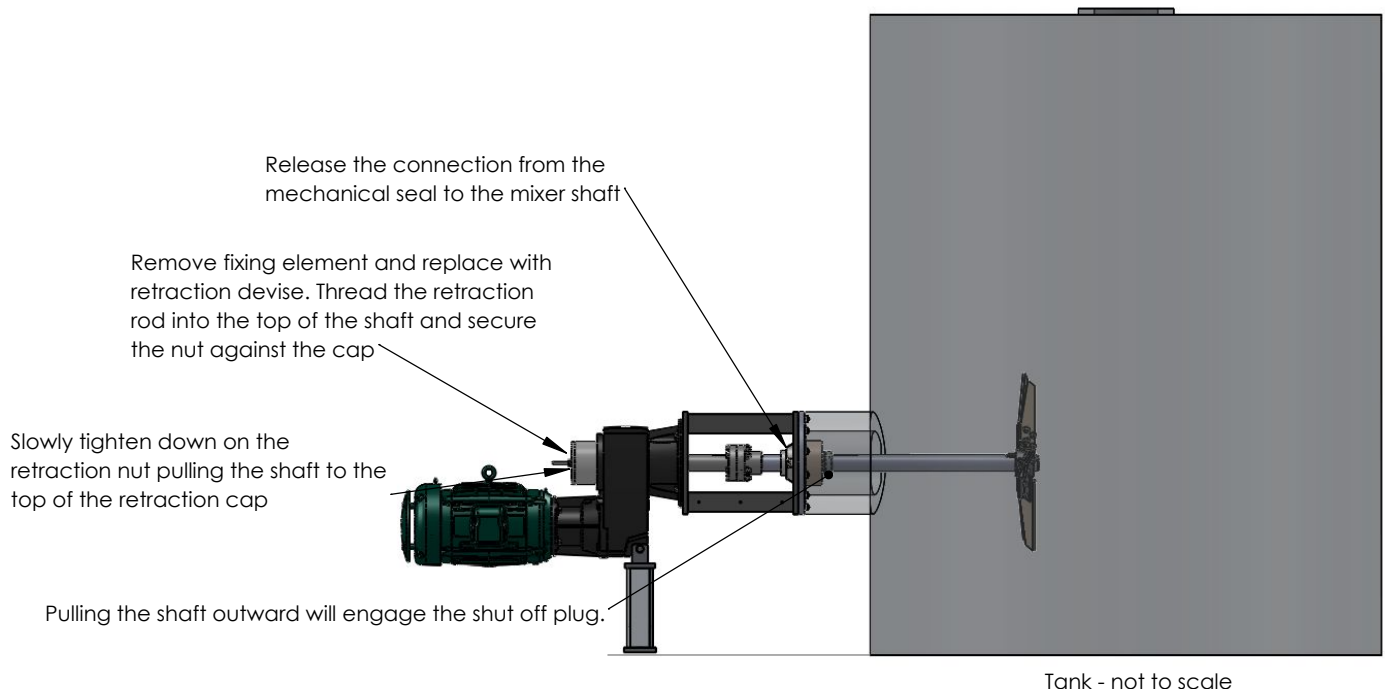
Once the mixer is assembled to the tank. It's good practice to double check the impeller and shut off assemblies on the inboard side of the tank; since side entry mixers are typically mounted at the bottom of very large volume tanks. There's a good chance you will not have access to the inboard components once the tank is filled.



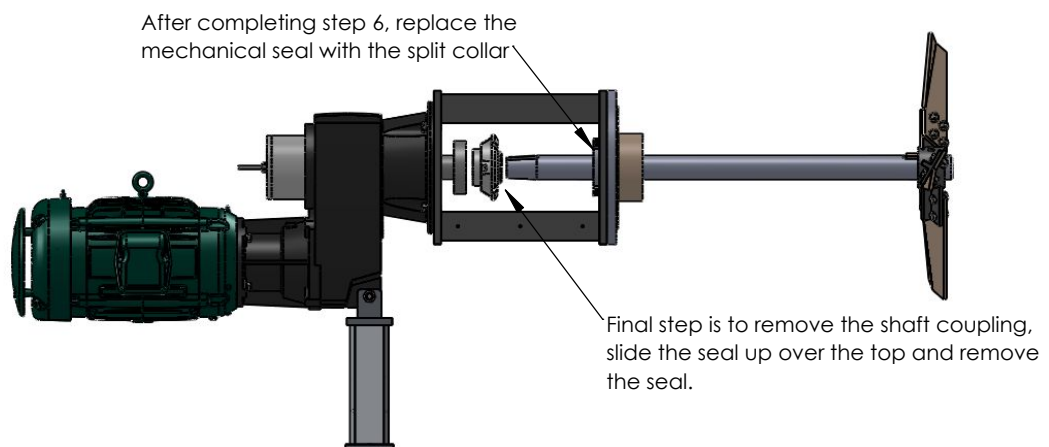
SIDE ENTRY SHUT OFF PLUG

All mechanical seals provided with side entry mixers will come supplied with a set of their manufacturers' instructions. If your side entry mixer seal starts leaking, please first refer to the seal instructions to review the installation procedure, flush requirements and the manufacturers' trouble shooting guide.

The Cleveland Mixer shut off plug should only be activated as a last resort. It's always best to drain your tank before removing the mechanical seal. If it is necessary to activate the plug in order to perform maintenance on the seal, please take the following steps: (1) Turn the mixer off - You will need the shaft retraction device and split collar that were provided with your mixer. (2) Remove the cap plate and fixing element from the top of your mixers gear reducer. (3) Thread the retraction rod into the top of the mixing shaft, then screw the nut down until it mates against the top of the retraction device. (4) Release the connection between the mechanical seal and shaft (typically set screws). (5) Tighten the nut on the retraction device, drawing the shaft out of the mixer towards you. Tighten the nut until the shaft pulls all the way up to the retraction cap. (6) Very slowly! Start to release the mounting bolts for the mechanical seal. If the plug is properly engaged, you shouldn't get any more than a drip from the seal area. Remove the bolts and slide the seal up to the shaft coupling. (7) Replace the seal with the split collar. (8) Disconnect the removable coupling from the stub shaft flange in the center of the mixer shaft. (9) Slide the mechanical seal up over the top of the seal and remove it to perform maintenance.



The shut off plug holds water column pressure and is only to be used as a last resort. This plug is not designed to be engaged while the mixer is in operation. Since the plug sits on the inboard side of the tank and can't be inspected before use, use extreme caution when activating the plug. Do not use this plug with hazmats or dangerous materials.



TROUBLE SHOOTING

PROBLEM WITH THE REDUCER		POSSIBLE CAUSES	SUGGESTED REMEDY
RUNS HOT	Overloading High Amp Draw	Load exceeds the capacity of the reducer	Check approval drawing for design capacity
		Insufficient Lubrication	Check lubrication level and adjust to recommended level
	Improper Lubrication Foaming, Steaming	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 Vibrating or Shaking	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. Autovent may be clogged. Replace or clean.
		Overfilled reducer	Check lubricant level and adjust to recommended level.
		Autovent clogged	Clean or replace, being sure to prevent any dirt from falling into the reducer.
		Improper mounting position, such wall or ceiling mount horizontal reducer	Check mounting position to approval drawings

