



**SERIES 400, 600, 900
MIXER OWNER'S MANUAL**

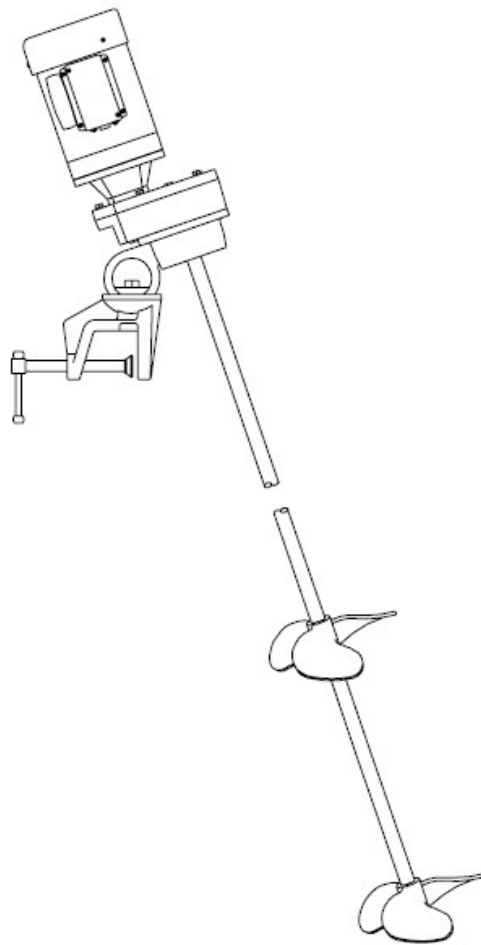


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ABOUT THIS MANUAL

Read this Owner's Manual Prior to Using Your Grovhac Mixer

Read all instructions prior to operating mixer. Injury to personnel, damage to property, or premature equipment failure may occur if mixer is improperly installed or operated. **Do not discard this manual;** keep this owner's manual for future reference.

Important Safety Terminology

Please see the following table regarding safety terminology used throughout this owner's manual. When referring to this manual, read the information following each safety term carefully before proceeding. Failure to follow the recommendations in this manual can result in personal injury or damage to property.

SAFETY TERMS	<i>Result if recommendations are ignored</i>
DANGER	Severe personal injury or death will occur if hazard is ignored.
<i>Warning</i>	Severe personal injury or death can occur if hazard is ignored.
Caution	Minor injury or property damage can occur if hazard is ignored.

MIXER INSTALLATION

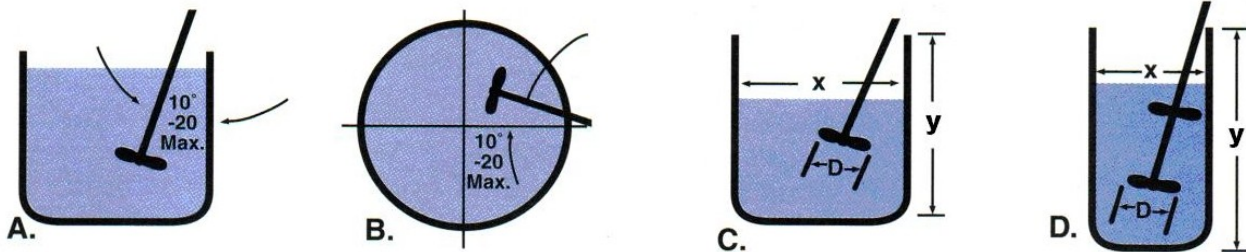
Handling

Never lift a mixer by its shaft. Grovhac mixers & agitators should be handled by lifting only on the gearbox or drive unit, while also carefully supporting the mixer shaft & blades.

Mounting

Mount your mixer on a level tank surface and fasten securely; your mixer may fasten using bolts, threaded bung, or clamps. **For C-Clamp mixers, never use tools to tighten clamp; hand tighten only.**

The following illustrations show recommendations for mounting mixers and number of propellers required.



For proper mixing action in tanks without baffles, mixer shafts should be mounted 10° to 20° off vertical and 10° to 20° off the tank center line, as shown in Illustrations A & B.

If the depth of the liquid (y) is approximately equal to the diameter of the tank (x), a single propeller may be used, as shown in Illustration C. Dual propellers are usually specified when the liquid depth (y) is 1.5 times (or greater) the diameter of the tank (x), as shown in Illustration D. The bottom propeller should be placed 1 to 2 propeller diameters from the bottom of the tank.

Set-up

Mixers with Air Motors

Install your air motor using air lines the same size or the next size larger than the intake port of the motor.

It is recommended that you install a moisture trap and filter/lubricator in the air line ahead of the motor. Excessive moisture in the air line can cause rust formation in the motor and might also cause ice to form on the muffler (due to expansion of air through the motor). Lubrication is necessary for the bearings, shaft seals, and to prevent rust formation.

Note: allowing excess moisture or foreign particles from the air line to enter the motor will nullify any warranties.

If operating the motor intermittently without automatic air line oiler, place motor in accessible position for easy lubrication.

A non-reversing motor will operate properly in one direction only; a reversible motor will work equally well in both directions; all Grovhac mixers are designed to run clockwise when viewed from the top of the motor.

When coupling or connecting the motor to a driven member, avoid any end or side thrust and **never hammer on the shaft.**

Mixers with Electric Motors

For electric motors without electrical plugs, check local codes for wiring instructions.

Before making electrical power connections, check for proper grounding of motor and application. All electrical contacts and connections must be properly insulated and enclosed. Prior to connecting to the power line, check nameplate for proper voltage and rotation connection. All Grovhac mixers are designed to run clockwise when viewed from the top of the motor.

Caution: Your electric motor should be installed in compliance with the National Electric Code, OSHA, and any other applicable codes, Voltage at motor not to exceed + or – 10% of nameplate voltage. Authorized person should make all electrical connections.

Motor should be located in a clean and dry area with adequate ventilation. Motor must be protected from the weather, if installed outdoors.

Warning: use only explosion-proof motors for applications with explosive gases or materials present.

BEFORE OPERATING YOUR GROVHAC MIXER

- ✓ **Remove all packaging materials**, especially those fastened to the mixing equipment for transit.
- ✓ **Always** make sure mixer is properly supported.
- ✓ **Always** place mixer shaft in liquid before operating.
- ✓ **Never** use for flammables or combustibles without having an approved explosion-proof motor.
- ✓ **Always** properly ground mixer when mixing flammables or combustibles.
- ✓ **Always** wear protective clothing, eyewear, and follow standard safety procedures.

OPERATING YOUR GROVHAC MIXER

Mixers with Air Motors

Your air motor is a precision built rotary-type motor and is designed to be driven by compressed air only. The air motor must not be driven by fluids, particles, solids, or any substance mixed with air, particularly combustible substances likely to cause explosions.

Warning: solid or liquid material exiting the air motor can cause eye or skin damage – keep away from air stream.

Warning: some air motor models may exceed 85dB sound level – hearing protection is recommended.

The stalled or starting torque of your air motor is less than the running torque and will vary depending on the position at which the vanes stop in relation to the air intake port. Operate motor well below available line pressure so that full line pressure can be called upon for overloads on motor. The speed and torque can be regulated by using a pressure regulator or a simple shut-off valve.

Caution: do not allow the air motor to "run free" at high speeds with no loads – excessive internal heat build-up, loss of internal clearances, and rapid motor damage will result.

Mixers with Electric Motors

Warning: be careful when touching the exterior of an operating motor – it may be hot enough to cause injury. Normal operating temperature of motor may be high enough to be uncomfortable or to cause injury if touched.

MIXER MAINTENANCE

Motor Maintenance & Service

Air Motors

Warning: always disconnect the air supply before servicing.

Use SAE10 oil to lubricate your air motor. For moderate speeds or intermittent operation, one squirt of oil in bearing oilers per day will suffice. If the duty is continuous or speed is high, use an automatic air line oiler set to feed one drop per minute. The bearings will receive oil from the rotor chamber during automatic oiling.

If the motor is sluggish or inefficient, try flushing with a non-combustible solvent. **Always flush in a well ventilated area.** To flush with solvent, disconnect the air line and muffler and add several teaspoons or spray solvent directly into motor. Rotate the shaft by hand in both directions for a few minutes, re-connect the air line and apply pressure slowly until there is no trace of solvent in the exhaust air. **Warning: wear eye protection and keep face away from exhaust air – foreign material exiting the air motor can be hazardous.** Check the muffler felts or elements for grease, dirt, or other contaminants. If dirty, wash them in a solvent. Replace the felts or elements and reconnect the muffler. Re-lubricate the motor with a squirt of oil in the chamber and bearing oilers.

The motor's vanes take up their own wear and will last between 5,000-15,000 hours depending on speed, method of oiling, operating pressure, and precautions taken in maintaining the motor. If the vanes need replacing, or if foreign particles are present in the motor chamber, an experienced mechanic may remove the end plate opposite the drive shaft end. **Do not pry open with a screwdriver;** prying will dent the surface of the plate and body, which can cause leaks. A puller tool should be used which will remove the end plate while maintaining the position of the shaft. New vanes should have the edge with the corners cut on angle (notched edge if reversible air motor) towards the bottom of the vane slot. New gaskets should be the proper thickness (similar to onion skin), otherwise the motor will operate inefficiently and waste air. The end plates should be replaced carefully using an arbor press with a pusher acting on both races of the bearing while supporting the opposite (drive) end of the shaft. This will eliminate the risk of stress fatigue and misalignment of the rotor.

Please see the following chart for motor top clearance (between rotor and bore) and total end clearance (between the sides of the rotor and the end plates).

AIR MOTOR CLEARANCE CHART		
<i>Models</i>	<i>Total End Clearance (in / mm)</i>	<i>Top Clearance (in / mm)</i>
1101, 1111, 1111-15, 1UP	0.0020" / 0.0508mm	0.0015" / 0.0381mm
1102, 1302	0.0025" / 0.0635mm	0.0015" / 0.0381mm
1103, 1223, 1303	0.0035" / 0.0889mm	0.0015" / 0.0381mm
1104, 1224, 1304	0.0035" / 0.0889mm	0.0015" / 0.0381mm
1225, 1305	0.0048" / 0.1219mm	0.0015" / 0.0381mm

In many cases, it is quicker and more cost effective to send the motor back to the factory for repair. For more information on air motor repairs, please contact your Grovhac representative.

Electric Motors

Warning: always disconnect the power source before working on or near a motor or its connected load.

Warning: use approved non-explosive and non-flammable materials when cleaning electrical equipment. Do not attempt to clean the motor while electrical power is connected.

Your electric motor is supplied with pre-lubricated ball bearings, lubricated for life of the bearing. Do not attempt to lubricate the motor's bearings.

Direct current (DC) motors have motor brushes that need periodic inspection and replacement as wear indicates. Brush wear is greatly influenced by individual application. It is recommended that brush wear be checked at early intervals of operation in order to determine future required inspection. Standard motor brushes have an initial length of 1¼". When the brushes are worn to a length of 5/8" they should be replaced.

If mechanical or electrical failure occurs, first check for proper electrical connections, fusing, or unusual binding of mechanical connections. If unable to correct the problem, please contact your Grovhac representative, describe the problem, and **include complete motor nameplate data.**

Removing the Mixer's Motor

Direct Drive Mixers

Tools and Materials Required

- ✓ 9/16" box wrench or adjustable wrench
- ✓ 5/8" box wrench or adjustable wrench
- ✓ 5/16" Allen wrench
- ✓ Two (2) 7/16"-14 bolts, approximately 3" long
- ✓ *LOCTITE*® or similar thread bonding agent
- ✓ Emery paper or similar light abrasive

To Remove the Motor

- 1) Remove the four (4) 3/8"-16 x 1" bolts and lock washers that secure the motor's C-face to the bearing housing.
- 2) Thread two (2) 7/16"-14 bolts (not supplied) into the 7/16" threaded holes of the bearing housing face. Alternately tighten the two bolts to push the motor off the bearing housing evenly (*note: stainless steel shaft coupling will normally come off with motor*)
- 3) Use a 5/16" Allen wrench to loosen the hollow set-screw in the shaft coupling. Remove the shaft coupling.

To Replace the Motor

- 1) Clean the inside diameter of the bearing in the bearing housing. Clean the outside of the stainless steel shaft coupling.
- 2) Remove the hollow set-screw and its set key from the shaft coupling.
- 3) Slide the shaft coupling onto the motor shaft. Align the hole in the shaft coupling with the keyway on the motor shaft. Insert the set key into the hole of the shaft coupling while aligning the keyway with the motor shaft. You may need a large screwdriver to adjust the set key so it lines up with the motor shaft.
- 4) Place a few drops of *LOCTITE* or similar thread bonding agent on the threads of the hollow set-screw. Thread the hollow set-screw into the coupling and fully tighten using a 5/16" Allen wrench.
- 5) Slide the bearing housing assembly over the shaft coupling (*note: due to close tolerances and thread locking compound build-up, you may need to clean the shaft coupling with emery paper or a similar light abrasive for it to fit inside the bearing*).

- 6) Replace the four (4) 3/8"-16 x 1" motor bolts and lock washers, **but do not yet fully tighten.**
- 7) Start motor and, while the motor is running, alternately tighten the four (4) motor bolts until they are secure (*note: motor bolts must be tightened in this manner to ensure proper alignment of the coupling and bearing housing components*).

Gear Drive Mixers

Tools and Materials Required

- ✓ 9/16" box wrench, socket wrench, or adjustable wrench
- ✓ Small amount of light grease

To Remove the Motor

- 1) Remove the four (4) 3/8"-16 x 1" bolts w/ lock washers that secure the motor's C-face to the bearing housing.
- 2) Slide the motor up and out of the gear box (*note: ensure that the shaft key comes with the motor*).

To Replace the Motor

- 1) Place key in the motor shaft keyway. Lightly lubricate the motor output shaft and the keyway with a light grease.
- 2) Slide the motor output shaft into the hollow shaft of the gear box (*note: ensure that the key stays on the motor shaft*).
- 3) Align the holes of the gear box face with the holes on the motor C-face and replace the four (4) bolts (3/8-16 x 1") w/ lock washers to secure the motor to the gear box.

Gear Box Maintenance & Service

Your Grovhac gear reducer has been tested and adjusted at the factory. Dismantling or replacement of components will void the warranty.

The gear reducer is properly filled at the factory with sufficient lubricant for all mounting positions. The reducer may be mounted in any supplier approved mounting position without modification or changing oil level. The oil should be changed approximately every six (6) months or 2,300 hours; please see your gear box's part sheet for instructions on changing gear box lubricant.

Removing the Mixer's Gear Box

Tools and Materials Required

- ✓ 9/16" box wrench or adjustable wrench
- ✓ 5/8" box wrench or adjustable wrench
- ✓ 5/16" Allen wrench
- ✓ Two (2) 7/16"-14 bolts, approximately 3" long
- ✓ *LOCTITE*® or similar thread bonding agent
- ✓ Emery paper or similar light abrasive

To Remove the Gear Box

Note: Remove the mixer's motor from the gear box before attempting to remove the gear box (see *Removing the Mixer's Motor, Gear Drive Mixers, To Remove the Motor section*).

- 1) Remove the four (4) 3/8"-16 x 1" bolts and lock washers that secure the gear box's C-face to the bearing housing.
- 2) Thread two (2) 7/16"-14 bolts (not supplied) into the 7/16" threaded holes of the bearing housing face. Alternately tighten the two bolts to push the gear box off the bearing housing evenly (*note: coupling will normally come off with gear box*)
- 3) Use a 5/16" Allen wrench to loosen the hollow set-screw in the shaft coupling. Remove the shaft coupling.

To Replace the Gear Box

Note: Replace the mixer's motor on the gear box before attempting to replace the gear box (see *Removing the Mixer's Motor, Gear Drive Mixers, To Replace the Motor section*).

- 1) Clean the inside diameter of the bearing in the bearing housing. Clean the outside of the stainless steel shaft coupling.
- 2) Remove the hollow set-screw and its set key from the shaft coupling.
- 3) Slide the shaft coupling onto the gear box shaft. Align the hole in the shaft coupling with the keyway on the gear box shaft. Insert the set key into the hole of the shaft coupling while aligning the keyway with the gear box shaft. You may need a large screwdriver to adjust the set key so it lines up with the gear box shaft.
- 4) Place a few drops of *LOCTITE* or similar thread bonding agent on the threads of the hollow set-screw. Thread the hollow set-screw into the coupling and fully tighten using a 5/16" Allen wrench.

- 5) Slide the bearing housing assembly over the shaft coupling (*note: due to close tolerances and thread locking compound build-up, you may need to clean the shaft coupling with emery paper or a similar light abrasive for it to fit inside the bearing*).
- 6) Replace the four (4) 3/8"-16 x 1" gear box bolts and lock washers, **but do not yet fully tighten.**
- 7) Start motor and, while the motor is running, alternately tighten the four (4) gear box bolts until they are secure (*note: gear box bolts must be tightened in this manner to ensure proper alignment of the coupling and bearing housing components*).



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NOTES

Lined area for notes, consisting of 18 horizontal lines.

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