This is a SAFETY ALERT SYMBOL. When you see this symbol on the product, or in the manual, look for one of the following signal words and be alert to the potential for personal injury, death or major property damage

DANGERS
Warns of hazards that WILL cause serious personal injury, death or major property damage.

WARNING
Warns of hazards that CAN cause serious personal injury, death or major property damage.

CAUTION
Warns of hazards that CAN cause personal injury or property damage.

NOTICE:
Indicates special instructions which are very important and must be followed.

Failure to disconnect and lockout electrical power before attempting maintenance can cause shock, burns or death

If pumping hazardous or toxic fluids, system must be flushed and decontaminated, inside and out, prior to performing service or maintenance

Disconnecting fluid or pressure containment components during pump operation can cause serious personal injury, death or major property damage

Failure to disconnect and lockout electrical power or engine drive before attempting maintenance can cause severe personal injury or death.

Failure to relieve system pressure prior to performing pump service or maintenance can cause severe personal injury or property damage.

Failure to allow gear reducer to cool before attempting maintenance can cause serious personal injury.

NOTE: Numbers in parentheses following individual parts indicate reference numbers on the corresponding Lip Seal Parts Lists.

NOTICE:
Blackmer gear reducers MUST only be installed in systems, which have been designed by qualified engineering personnel. The system MUST conform to all applicable local and national regulations and safety standards.

These instructions are intended to assist in the installation of and maintenance of the Blackmer gear reducer, and MUST be kept with the reducer.

Blackmer gear reducer service shall be performed by qualified technicians ONLY. Service shall conform to all applicable local and national regulations and safety standards.

Thoroughly review this manual, all instructions and hazard warnings, BEFORE performing any work on Blackmer gear reducer.

Maintain ALL system and Blackmer pump and reducer operation and hazard warning decals.

Pump manuals, parts lists and other needed literature may be obtained from the Blackmer website (www.blackmer.com) or by contacting Blackmer Customer Service.
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<thead>
<tr>
<th>Ref. No.</th>
<th>Description</th>
<th>Parts per Unit</th>
<th>Part No.</th>
<th>Ref. No.</th>
<th>Description</th>
<th>Parts per Unit</th>
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* Non-saleable item – included in Body/Cover Assembly.


---

**GEAR AND PINION SELECTION TABLE**

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**NOTE:** Speed is based on 1750 rpm input.
INSTALLATION

NOTICE
This product must only be installed in systems which have been designed by those qualified to engineer such systems. The system must be in accordance with all applicable regulations and safety codes and warn of any hazards unique to the particular system.

ALIGNMENT ADJUSTMENT
The gear reducer can be moved vertically on its bracket mount to raise or lower the output shaft (slow speed shaft) to align with the pump shaft.

The reducer can also be rotated on the bracket ring to facilitate both horizontal and vertical alignment of the input shaft (high speed shaft) to the motor shaft. This flexibility in movement eliminates the need for shims under the motor or driver in most cases. NOTE: Refer to Blackmer Dimensions 109-103 for maximum variation of shaft alignment to maintain proper gear reducer lubrication.

Follow these steps to align the reducer:

1. Align the output shaft to the pump shaft by loosening the four (4) setscrews (108K) and locknuts in the mounting bracket (108L), enabling the reducer to slide freely on the slider posts.
2. Once the proper alignment is determined, retighten the setscrews and locknuts. Leave the torque arm locknuts loosened for the next step.
3. Align the input shaft to the motor shaft by loosening the four (4) bracket nuts (108D) in the bracket ring (108A) enabling the reducer to rotate freely. If the reducer sticks on the mounting bracket, tap it lightly with a mallet.

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4. After obtaining the correct alignment, be sure to retighten the bracket nuts and the upper and lower locknuts of the torque arm.

COUPLING ALIGNMENT
Both angular and parallel coupling alignment MUST be maintained between the pump, gear, motor, etc. in accordance with manufacturer’s instructions. Verify coupling alignment after installation of new or rebuilt pumps. See fig. 1.

1. Parallel alignment: The use of a laser alignment tool or dial indicator is preferred. If a laser alignment tool or dial indicator is not available, use a straightedge. Turn both shafts by hand, checking the reading through one complete revolution. Maximum offset must be less than .005” (125 microns).
2. Angular alignment: Insert a feeler gauge between the coupling halves. Check the spacing at 90º increments around the coupling (four check points). Maximum variation must not exceed .005” (125 microns). Some laser alignment tools will check angular alignment as well.
3. Replace the coupling guards after setting alignment.

LUBRICATION

Gear reducers are not lubricated at the factory. Oil MUST be added before starting the pump.

Horsepower calculations for Blackmer reducers are based on 75°F (24°C) ambient air temperature; 200°F (93°C) maximum oil temperature using synthetic oil.

Blackmer recommends using synthetic oil with oxidation inhibitors and is compatible with Buna elastomers. Use synthetic oil AGMA Viscosity Grade 4 or ISO Viscosity Grade 150 such as Mobil SHC 629, Mobil SHC 630, Shell Omala S4 GX 150, Castrol Isolube EP 150 or equivalent.

To add oil to the gear reducer:

1. Remove the oil level plug (29) and the fill and vent plug (76C). NOTE: The vent fitting in the fill plug (76C) should be kept clean to prevent expansion from forcing oil leaks at the shaft.
2. Add oil through the filler hole until oil runs out of the oil level hole – approximately 1.25 qt. (1.18 l) depending on the orientation of the reducer mounting.
3. Replace the oil level plug and the fill and vent plug.
4. After the first two weeks of operation, the oil should be drained, the gearcase flushed, and new oil added.

For normal operation, the oil should be changed every six months or 1000 hours, whichever is shorter. If operation is accompanied by frequent and wide changes in temperature, or if the unit operates in an unusually moist or dusty atmosphere, the oil should be changed every 500 hours or every three months. NOTE: To maintain proper gear reducer lubrication, refer to Blackmer Dimensions 109-103 for maximum variation of shaft alignment.

REDUCER DISASSEMBLY
The gearcase on the bracket mounted gear reducer can usually be removed from its bracket without disturbing the motor or pump mounting.

1. Take apart the couplings and remove the six bracket nuts (108D) and lockwashers (108C) from the bracket ring. Also remove the upper locknut and lockwasher from the torque arm (108E).
2. Once the bracket nuts are removed, rotate the gearcase on the bracket and swing the input shaft away from the motor.
3. The gear reducer can then be lifted off the pump with the bracket ring and studs still intact.

MAINTENANCE

NOTICE:
Maintenance and troubleshooting must be done by an individual experienced with pump and reducer maintenance and the type of system involved.

NOTICE:
To avoid possible entanglement in moving parts do not lubricate pump bearings, gear reducer or any other parts while the pump is running.

CAUTION: The normal full load operating temperature of the gearcase is 180°F (82°C) – too hot to touch with the bare hand.

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3. The gear reducer can then be lifted off the pump with the bracket ring and studs still intact.
4. Remove the twelve hex-head cover capscrews (112). 
   NOTE: The gearcase cover is located on the gearcase with 
   two (2) dowel pins (38). These pins remain in the gearcase. 

5. After the capscrews have been removed, insert a wedge 
   between the projecting lugs on the gearcase cover and 
   tap lightly until the cover loosens and can be removed 
   from the casing. 

6. Remove the cover gasket (111). 

7. The pinion & shaft (input shaft) (102) is a one-piece 
   assembly and does not come apart. If necessary, the 
   bearings (24A) can be removed from the shaft with the use 
   of a bearing puller or arbor press. 

8. To remove the gear (101) and bearings (24) from 
   the output shaft (125), use a gear puller or arbor press. Support 
   the assembly on the gear and press the shaft out of 
   the gear and one bearing only. The second bearing must come 
   off in the other direction because of the shoulder on the 
   shaft. 

OIL SEAL REPLACEMENT 

1. To replace the oil seal (104A) on the input shaft, it is only 
   necessary to remove the closure plate (114). Once the 
   plate is removed, the old seal can be pressed out and 
   a new one installed. Grease the lip of the oil seal 
   before installing. The oil seal must be inserted such that 
   the lip of the 
   seal will face inward when the closure plate is 
   reattached to the gearcase cover. 

2. To replace the oil seal (104) on the output shaft, it is 
   necessary to disassemble the body and cover assembly 
   and remove the output shaft. (Refer to “Reducer 
   Disassembly.”) Grease the lip of the oil seal and insert it 
   into the bearing bore of the gearcase so that the lip of 
   the 
   seal faces inward. 

REASSEMBLY 

Before reassembling the gear reducer, clean each part 

   a. Before installing the gear and bearings, remove all 
   dirt, burrs, or sharp corners from the shaft to prevent 
   galling or seizing of the gear and shaft. 

NOTE: Disregard steps 1 and 2 if the shaft and bearing 

   assemblies have not been dismantled. 

   b. Apply a coat of graphite, molysulphide, or white lead 
   to the shaft. 

   c. Press the short end of the shaft (125) squarely into 
   the bearing (24), and install the spacer ring (82). 

   d. Align the gear key (124) with the notch in the gear, 
   and press the gear (101) squarely onto the shaft. 

   e. Add a spacer ring (82) and press the second bearing 
   (24) onto the shaft. 

2. Prior to installing the bearings, follow steps 1a and 1b. To 
   assemble the input shaft (102) (Pinion & Shaft), press a 
   bearing (24A) onto each end of the shaft. 

3. After the shafts, gears and bearings have been 
   assembled, apply a light film of oil in the bearing bores of 
   the gearcase to help the bearings slide into position. 

4. If the oil seal (104) has been removed from the gearcase, 
   it must be replaced prior to reassembly. Refer to step 2 of 
   “Oil Seal Replacement.” 

5. To install the shaft assemblies into the gearcase it is 
   easiest to tip the gearcase so that it is resting on the 
   bracket studs with the cavity opening upward. 

6. Once the input and output shaft assemblies are properly 
   installed, set the cover gasket (111) on the gearcase. 

7. Position the cover on the gearcase using the dowel pins 
   for alignment. 

8. Install and tighten the cover capscrews (112). 

9. Make sure the oil seal (104A) is inserted in the closure 
   plate (114) before reattaching the plate to the gearcase 
   cover. Refer to step 1 of “Oil Seal Replacement.” 

10. Attach the closure plate gasket (115) and the closure 
    plate (114) to the gearcase cover. 

TROUBLESHOOTING 

POSSIBLE CAUSES: 

1. Worn or damaged bearings. 

2. Inadequate lubrication / use of wrong 
   lubricant. 

3. Impurities in the lubricant, such as 
   abrasive particles. 

4. Excessive overloading. 

5. Misalignment to either pump or motor. 

REMEDY: 

Replace bearings. 

Check oil condition. The lubricant may not be getting to the contact areas of the 

gear teeth, or the viscosity of the oil may be too low for the operating 

temperature (see “Lubrication”). 

Replace with clean oil (see “Lubrication”) 

Overloading causes overheating which may lower oil viscosity and thus cause 

the oil film on gear teeth contact surfaces to break down. The gears will begin to 

“groan” as the oil loses its effectiveness. If the loading is not decreased, the gear 

teeth will begin to “bite” into each other and wear out rapidly. 

Recheck alignment and adjust as necessary.