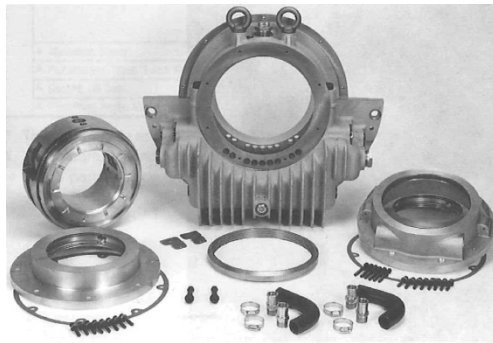


DODGE® SLEEVOIL® M-Series Center Flange Bearing Assembly and Operating Instructions

These instructions must be read thoroughly before installing or operating this product.

WARNING: Only Qualified Personnel familiar with the construction and operation of this equipment and the hazards involved should install, adjust, operate, and/or service it. Read and understand this manual in its entirety before proceeding. Failure to observe this precaution could result in severe bodily injury or loss of life.

Sleeve bearing performance is dependent on proper installation, lubrication and maintenance. Before assembling the bearing read ALL instructions in this manual and follow all equipment manufacturer's instructions.



BEARING DESCRIPTION

Flange Mounted Bearing with Loose Oil Ring

Type: m-Series

For electric motors and generators, fans, compressors, etc.
All components are fully split

Housing

Finned, pedestal, foot-mounted

Heat Dissipation

Self cooled, or cooled by external circulating oil system

Bore Shape

Plain cylindrical bore with two axial grooves

Thrust Surfaces

Modified tapered land babbitt faces with

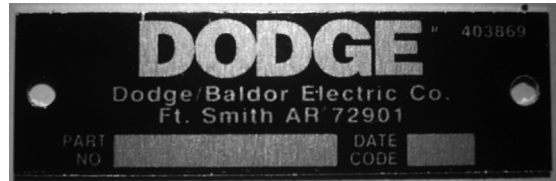
Nomenclature Example

M18-200 = Size 18 center flange housing
200mm liner bore diameter

WARNING: Because of the possible danger to persons(s) or property from accidents which may result from the improper use of products, it is important that correct procedures be followed. Products must be used in accordance with the engineering information specified in the catalog. Proper installation, maintenance and operation procedures must be observed. The instructions in the instruction manuals must be followed. Inspections should be made as necessary to assure safe operation under prevailing conditions. Proper guards and other suitable safety devices or procedures as may be desirable or as may be specified in safety codes should be provided, and are neither provided by Baldor Electric nor are the responsibility of Baldor Electric. This unit and its associated equipment must be installed, adjusted and maintained by qualified personnel who are familiar with the construction and operation of all equipment in the system and the potential hazards involved. When risk to persons or property may be involved, a holding device must be an integral part of the driven equipment beyond the speed reducer output shaft.

INTRODUCTION

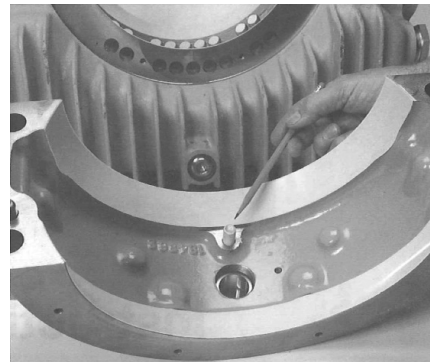
The modular design of the SLEEVOIL Flange Bearing allows the use of multiple sizes of liners, oil seals, and air seals with the same housing. All housings and liners have nameplates attached. The nameplates give a unique number which fully identifies the housing and/or liner with any and all modifications to that part.



All bearing liners are hi-tin babbitted, with plain 2-axial groove bores and modified tapered-land thrust profiles. To minimize spare parts required, the same liner is used in the non-expansion (fixed) and expansion (free) positions. All bearings are electrically insulated with a non-conducting material applied to the housing's spherical seat.

NOTE: Do not remove this lining.

Grounding is determined by the length of the ground screw in the housing cap.



The anti-rotation pin and shaft oil and air seals are also electrically insulated.

Temperature sensors that contact the bearing liner should be insulated appropriately (i.e. insulated protection tubes, non-metallic fittings, etc.).

Threaded holes for connecting a temperature sensor (RTD's or thermocouples), oil sight glass, oil inlet, oil outlet, sump heater, and sump thermostat are provided on either side so that all connections can be made on the right or left side of the bearing housing as required. Refer to the machine's dimensional drawing and reference drawings for proper location. Oil is filled via the oil ring sight glass hole in the top of the housing cap. The all drain is located in the lower front side of the bearing housing. In the case of circulating oil lubrication, the outlet connection is screwed into the oil sight glass hole.



The bearing is furnished with an additional air seal to prevent oil loss caused by vacuum or pressure zones generated by shaft rotation.

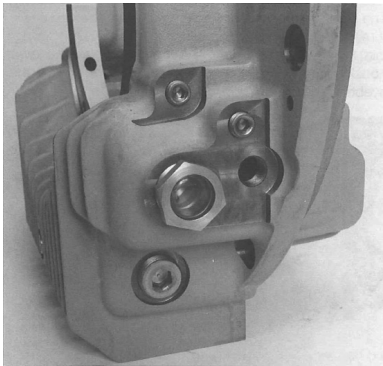
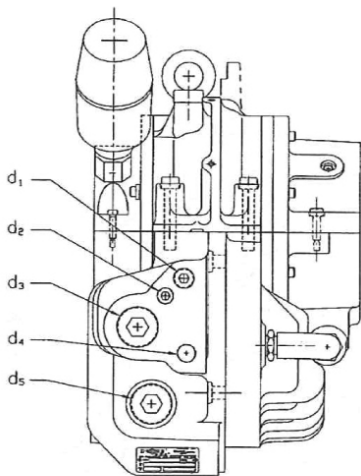


Table 1 lists the sizes of the external connections (see drawing below) that can be made to the lower part of the bearing housing. The thread form is ANSI Dryseal Standard Taper Pipe Thread (NPTF) for circulating oil connections (d2 and d3), and ANSI Dryseal Standard Fuel Internal Straight Pipe Thread (NPSF) for the remainder.

Table 1 - Housing Connection Sizes (Diameter r, Inches					
Housing Size	d1	d2	d3	d4	d5
M-9	1/2 NPSF	3/8 NPSF	1-1/4 NPSF	1/2 NPSF	1-1/4 NPSF
M-11	1/2 NPSF	3/8 NPSF	1-1/4 NPSF	1/2 NPSF	1-1/4 NPSF
M-14	1/2 NPSF	3/8 NPSF	1-1/4 NPSF	1/2 NPSF	1-1/4 NPSF
M-1B	1/2 NPSF	3/8 NPSF	1-1/4 NPSF	1/2 NPSF	1-1/4 NPSF

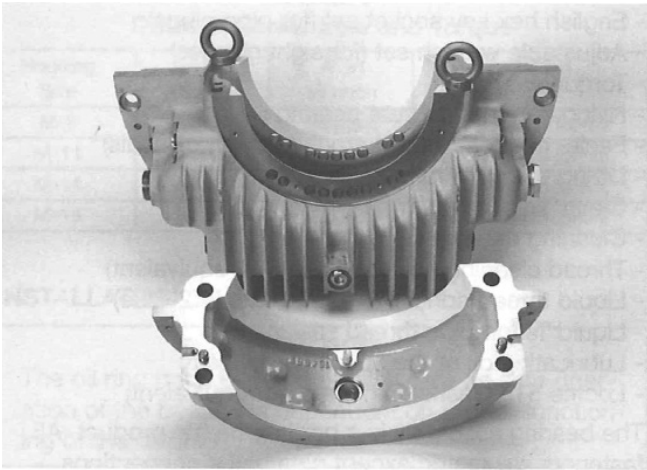
where

- d1 = Bearing Liner Temperature Sensor
- d2 = Circulating Oil Inlet
- d3 = Oil Level Sight Gage, Circulating Oil Drain
- d4 = Air Seal Vent
- d5 = Heater, Thermostat, Water Cooler



All housings and liners have match-marks permanently stamped above and below the joint. Use these matchmarks to ensure that parts stay paired.

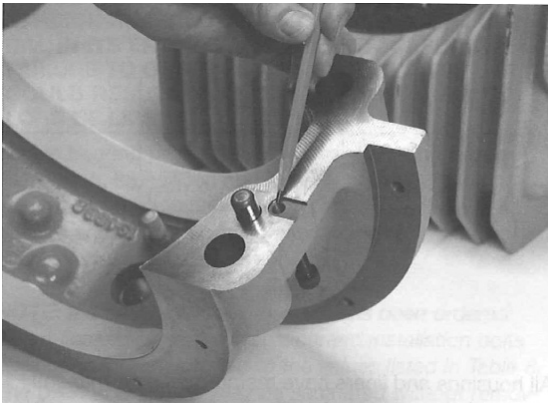
Bearing liner lower halves are provided with threads (M10-1.5 for the M-9 size and M12-12.75 for the remaining sizes) where lifting eyebolts may be temporarily attached.



Two eyebolts are provided in the upper half of the bearing housing for the transport of the bearing assembly only. These eyebolts can also be used to lift the housing base at the joint. For safety reasons, take special care to subject these eyebolts to tensile loads only and no bending stresses. Before lifting the bearing assembly, make sure the housing joint screws and eyebolts are tight.

Two pre-drilled holes are provided in each housing base for doweling the bearing to the mounting structure. See Table 10 for sizes.

Jacking screw holes are provided in the housing cap in the center of each pry slot. A screw used to hold an oil seal can be used to assist in separating the housing cap from the base.



The SLEEVOIL Flange Bearing is shipped partially assembled, without lubricant.

EQUIPMENT NEEDED

- Metric hex key (L -wrench) set
- Metric hex key (Allen drive) socket set
- English hex key socket set (for pipe plugs)
- Adjustable wrench set (for sight glasses)
- Torque wrenches
- Nylon hammer (to seat bearing liner)
- Feeler gauges or shim stock (to align oil seals)
- Lifting equipment
- Clean, lint free cloth
- Cleaning detergents
- Thread cleaning solvent (Loctite or equivalent)
- Liquid thread adhesive (e.g. Loctite 242 Blue)
- Liquid Teflon® pipe thread sealant
- Lubricating oil of the specified viscosity
- Loctite 515 Gasket Eliminator (or equivalent)

The bearing assembly is a partially metric product. All fasteners are metric except pipe plugs connections, which are American (NPSF and NPTF).

PRE-ASSEMBLY INSTRUCTIONS

Disassemble and thoroughly clean all parts of the bearing assembly. It is especially important that the interior of the housing and the running surfaces of the liner are clean and free of damage. The installer is the last person to inspect all parts for damage and cleanliness.

Threaded fasteners and threaded holes must be clean (use Loctite Cleaning Solvent or equivalent) and dry before using Loctite 242 (Blue) or equivalent thread locking adhesive.

CAUTION: Bearing housings, liners, oil seals, air seals, and oil rings may be interchanged as complete assemblies only. Individual halves are NOT interchangeable.

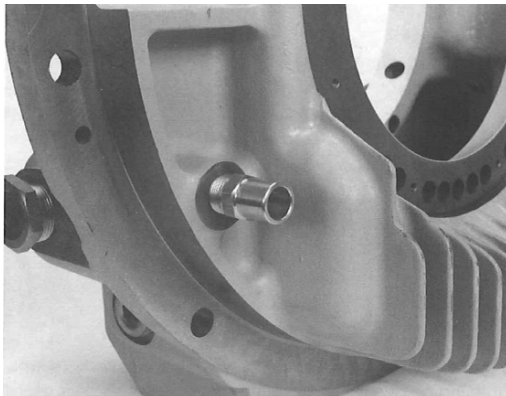
Look for signs of sealant on all pipe plugs and sight glasses. If it does not appear that sealant was used on the plugs or sight glasses, remove the fitting, clean the threads of the fitting and the hole and reseal with Teflon® pipe sealant.

INSTALLATION OF LOWER HOUSING

Check the mounting structure (contact face and mounting recess) for proper machining and that it is clean and free from burrs. Inspect the shaft to ensure it is smooth (Ra 0,63 µm, equivalent to 25 microlnches Ra surface finish or better), free of burrs or rough spots and clean.

If an air seal is used, install the two air seal beaded hose fittings in the lower housing.

The lifting eyebolts in the housing cap are the same thread size as the cap screw holes in the lower housing joint. These eyebolts may placed diagonally on the lower housing joint to lift the housing into position. Tighten the eyebolts securely.



CAUTION: Assembly will normally be made with the shaft in place. Be careful not to damage the rotor when installing the lower housing.

Place the flange housing base on the mounting structure and secure with 5 socket head cap screws. See Table 2 for screw size. Lightly tighten the mounting screws starting with the bottom screw and alternating side to side. Torque the mounting screws in steps to the value listed in Table 2.

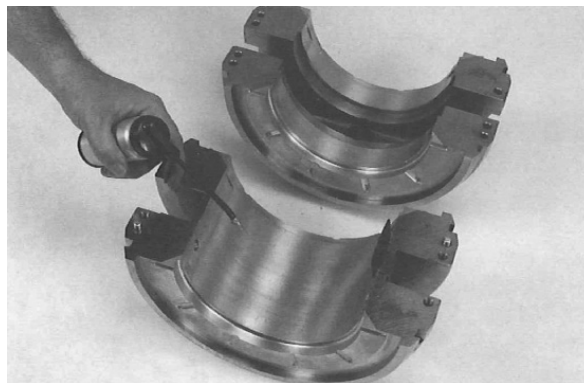
Table 2 - Housing Mounting Screw Size and Torque				
Housing Size	Mounting Hole Diameter	Screw Size	Allen Wrench	Tightening Torque
M-9	7/16" (11mm)	M10-1.50	8mm	41 Nm (30 lb ft)
M-11	33/64" (13mm)	M12-1.75	10mm	71 Nm (52 lb ft)
M-14	45/64" (18mm)	M16-2.00	14mm	170 Nm (125 lb ft)
M-18	55/64" (22mm)	M20-2.50	17mm	340 Nm (250 lb ft)

Use Grade 8.8 socket head cap screws.

INSTALLATION OF LOWER LINER AND SHAFT

CAUTION: The bore and thrust faces of the liner assembly are critical machined surface;; which are eaaiJy damaged. Use care in handling to protect these surfaces. Failure to observe these precautions may result in damage to or destruction of the equipment.

The lower liner half is identified by its continuous babbitted surface on the inner diameter. The upper liner half has an oil ring slot in the center of the babbitted bore.

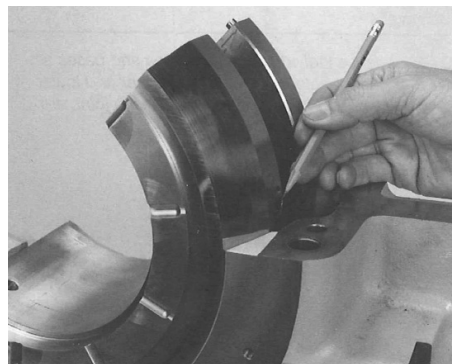


Clean the threaded holes for the 4 liner joint screws with cleaning solvent and dry. If optional oil dams are specified, also clean their 2 threaded mounting holes.

Apply oil to the bore of the lower liner.

With the shaft raised slightly, place the lower liner half on top of the shaft. NOTE: Orient the liner such that the liner thermocouple holes and the liner spherical seat with the oil distribution groove face the outboard end of the bearing housing. Remove the lifting eyebolts, if used. Rotate the lower liner half into the bearing housing, taking care not to damage the electrical insulation or babbitted surfaces.

Align the joint faces of the housing and liner. Carefully lower the shaft into place. Strike the lower housing with a slight blow using a nylon hammer to align the liner to the shaft.



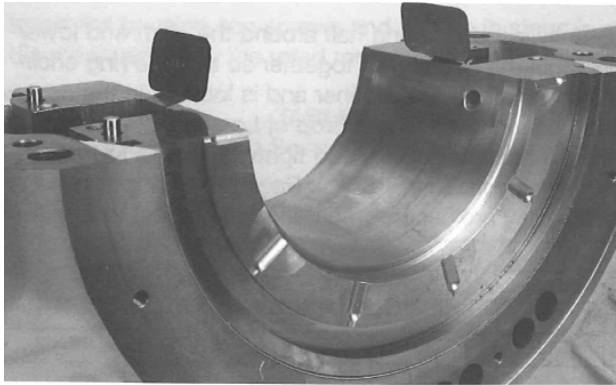


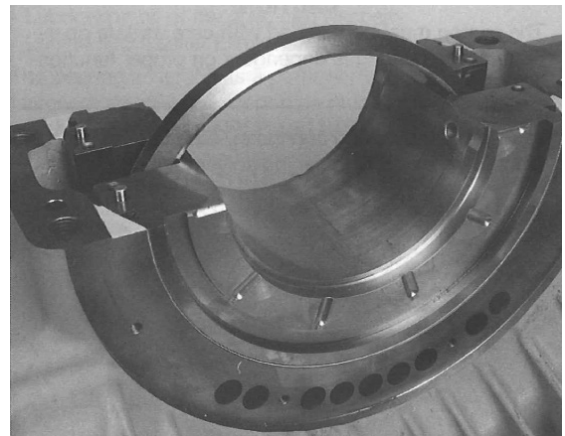
TABLE 4 - Oil Ring Screw Size and Torque			
Housing Size	Screw Size	Allen Wrench	Tightening Torque
M-9	M3-0.5	2.5mm	0.8 Nm (7lb.in)
M-11	M3-0.5	2.5mm	0.8 Nm (7lb.in)
M-14	M4-0.7	3mm	1.8 Nm (16 lb.in)
M-18	M4-0.7	3mm	1.8 Nm (16 lb.in)

Oil the shaft under the oil ring. Make sure the oil ring rotates freely.

INSTALLATION OF UPPER LINER

NOTE: The upper liner half is identified by its oil ring slot in the center of the babbitted bore. Each liner half is marked by a letter or number near the split line. Because individual liner halves are NOT interchangeable, make sure the upper and lower liner match marks are identical.

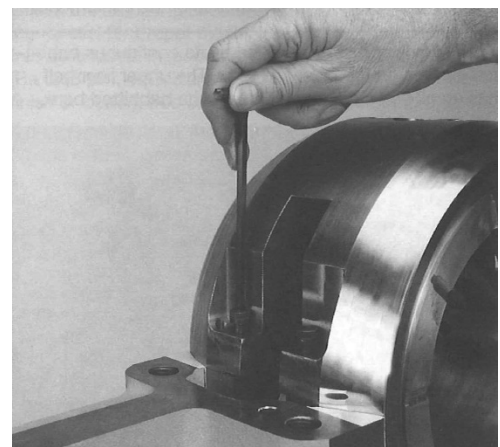
Apply oil to the faces of thrust collars next to the liner and to the top of the shaft or to the babbitted surfaces of the upper liner. Place the upper liner on the lower liner taking care to align the dowel pins and the match marks. Three dowel pins are used to ensure that the liner is not reversed.



NOTE: The liner spherical seat with the oil distribution groove should face the outboard end of the bearing housing. If it is on the inboard side of the housing, the lower liner half must be removed and reversed.

Make sure the oil ring can rotate freely.

Clean the 4 liner joint screws with cleaning solvent and dry. Place 2 drops of Loctite 242 on each screw. Insert the liner screws and tighten in steps in a diagonal pattern to rated torque listed in Table 5.



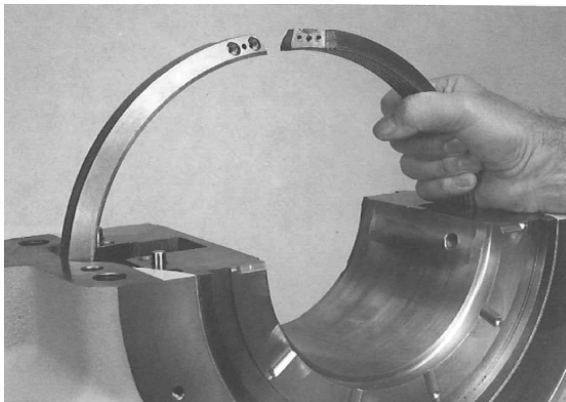
If specified, install the two optional oil dams. The oil dam is a small piece of preformed sheet metal used to direct more oil into the liner axial feed groove. Each oil dam is attached to the lower liner using an 8mm long button head cap screw. Clean the screws with cleaning solvent and dry. Place one drop of Loctite 242 on each screw. Install the screws and torque to the value listed in Table 3.

TABLE 3 - Oil Dam Screw Size and Torque			
Housing Size	Screw Size	Allen Wrench	Tightening Torque
M-9	M4-0.7	2.5mm	1.5 Nm (13 lb-in)
M-11	M4-0.7	2.5mm	1.5 Nm (13 lb-in)
M-14	M4-0.7	2.5mm	1.5 Nm (13 lb-in)
M-18	M4-0.7	2.5mm	1.5 Nm (13 lb-in)

INSTALLATION OF OIL RING

CAUTION: The oil ring must be handled with care as safe operation at the bearing is dependent on proper functioning of the oil ring.

Disassemble the oil ring and clean. Clean the threaded holes and screws with cleaning solvent and dry.



Carefully insert one ring half around the shaft and lower liner. Join the two halves together so that the ring encircles the shaft and lower liner and is located in the center of the bearing. Place one drop of Loctite 242 on each screw. Install the screws and tighten in steps to the torque value listed in Table 4. Peen the oil ring screws to ensure they are securely tightened to prevent loosening.

Table 5 - Liner Joint Screw Size and Torque			
Housing Size	Screw Size	Allen Wrench	Tightening Torque
M-9	M6-1.00	5mm	8 Nm (70 lb in)
M-11	M6-1.00	5mm	8 Nm (70 lb in)
M-14	M6-1.00	5mm	8 Nm (70 lb in)
M-18	M8-1.25	6mm	20 Nm (175 lb in)

INSTALLATION OF HOUSING CAP

CAUTION: Before installation, verify that the non-metallic antirotation pin is installed in the housing cap. Failure to observe this caution could result in damage to the bearing.

NOTE: Because individual housing caps and bases are **NOT** interchangeable, make sure the upper and lower housing marks, located on one end near the joint are identical.



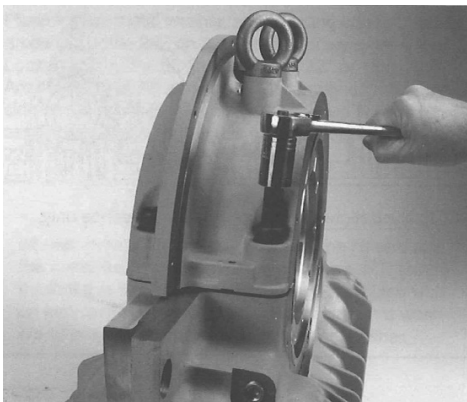
On the electrically grounded bearing assembly, loosen the grounding screw in the housing cap to allow the cap to seat properly at the joint.

Clean the upper and lower housing joint faces and the 4 threaded holes at the lower housing joint with a cleaning solvent and dry. Apply a thin layer of Loctite 515 Gasket Eliminator to the housing base joint.

Carefully lower the upper housing on the bearing assembly, noting the dowel pin locations. Make sure the antirotation pin lines up with its corresponding hole in the liner upper half. If the housing cap does not lower all of the way to the base joint, the bearing liner may need to be rotated in the bearing housing.

Clean the 4 housing cap screws with cleaning solvent and dry. Place 4 drops of Loctite 242 on each screw.

CAUTION: The 4 housing cap screws must be tightened in steps in a diagonal pattern to rated torque before final tightening of the lower housing mounting screws to prevent oil loss through the split line.



Insert the housing cap screws and tighten in steps in a diagonal pattern to the rated torque listed in Table 6.

Table 6 - Housing Cap Screw Size and Torque			
Housing Size	Screw Size	Allen Wrench	Tightening Torque
M-9	M10-1.5	8mm	41 Nm (30 lb.in)
M-11	M12-1.75	10mm	71 Nm (52 lb.in)
M-14	M16-2.00	14mm	170 Nm (125 lb.in)
M-18	M20-2.5	17mm	340 Nm (250 lb.in)

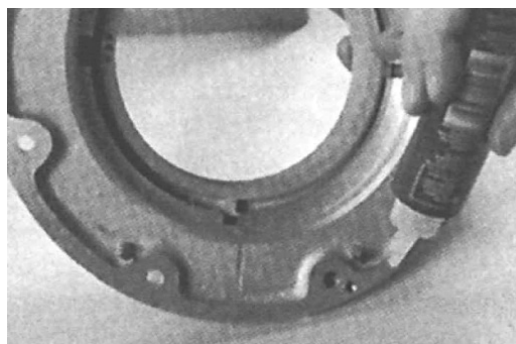
INBOARD OIL SEAL INSTALLATION (FLOATING LABYRINTH)

Floating seal carriers are located on the housing by dowel pins. Small shaft misalignments are accommodated by a clearance fit between the seal insert and the seal carrier.

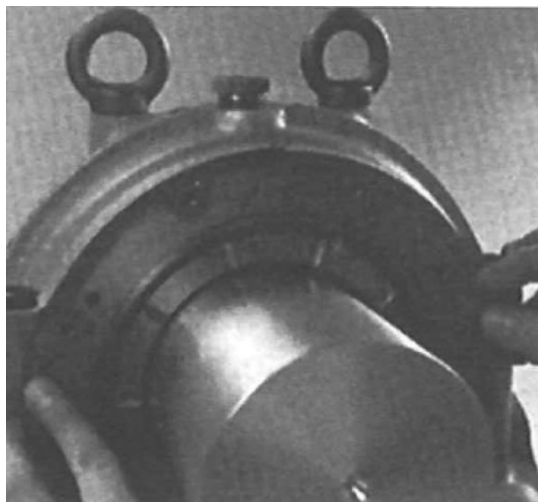
Clean the oil seal carrier and housing seal mounting faces and mounting screws and threaded holes with cleaning solvent and dry. Assemble the seal insert over the shaft and attach the garter spring. Note that the drain back holes in the seal insert must face the bearing housing and be at the 6:00 position.

Non-hardening sealing compound may be applied to the surface of the seal insert that contacts the seal carrier and to the seal carrier joint.

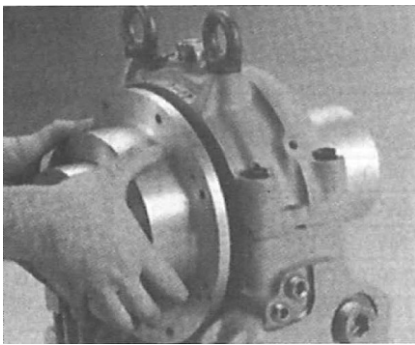
Assemble the seal carrier halves over the seal insert. When facing the bearing, the slot in the seal carrier for the insert's anti-rotation tab will be in the 9:00 position. Apply Loctite 515 Gasket Eliminator to the seal mounting face.



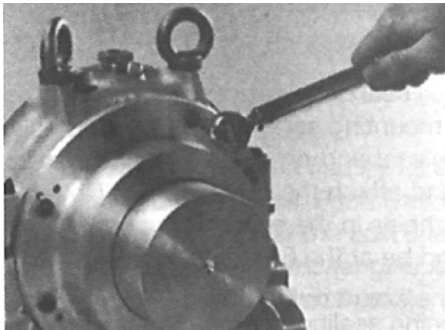
A gasket (0.8mm or 1/32" thick Armstrong N-8092) may be used instead of a gasket eliminator sealing compound. Place the gasket's lap or dovetail joint at the 12:00 position.



Slide the completed seal assembly up to the housing.



Place a thick metal washer and 2 drops of Loctite 242 on each of the 8 cap screws. Insert the screws and tighten in steps to the torque value listed in Table 8.



An alternate seal assembly method is to mount the seal carriers to the housing cap and base as a first step. The seal carriers are now a part of the housing. During bearing assembly, the lower seal insert half is rolled into position as shown below. The anti-rotation tab must line up with a corresponding slot in the seal carrier at the 9:00 position. Thread the garter spring around the lower seal half. Place upper seal half on the lower and secure both halves together using the garter spring. Non-hardening sealing compound may be applied to the surface of the seal insert that contacts the seal carrier and to the seal carrier joint.

INBOARD AIR SEAL AND OIL SEAL (FIXED LABYRINTH) INSTALLATION

Clean the inboard oil seal, air seal, and the threaded holes and screws at the joint with cleaning solvent and dry. Make sure there are insulating bushings in each mounting hole. The two long holes in the lower half of the M-9, M-11, and M-14 air seals use two insulating bushings.

Apply Loctite 515 Gasket Eliminator to the oil seal upper half joint face. Place 2 drops of Loctite 242 on each joint screw. Be careful not to get any Loctite on the shoulder part of the screw because removal of the screw will be more difficult. Assemble the oil seal around the shaft and tighten the screws in steps to the torque value listed in Table 7.

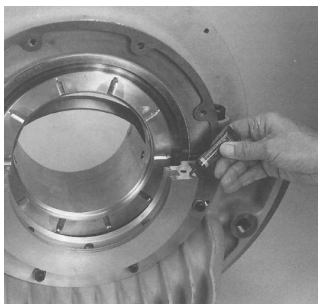
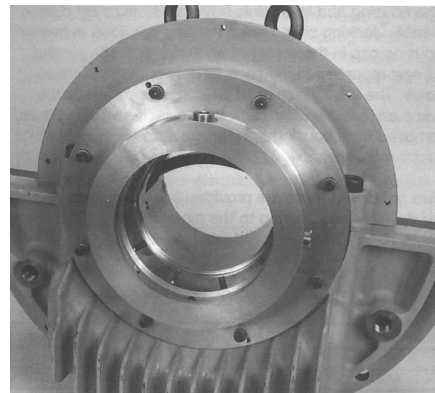
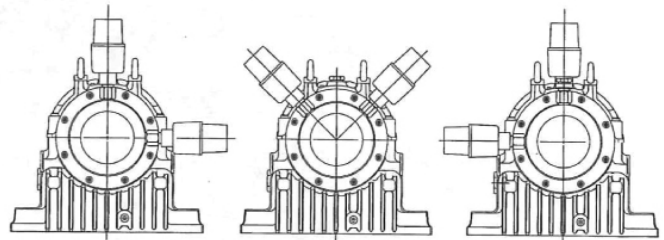
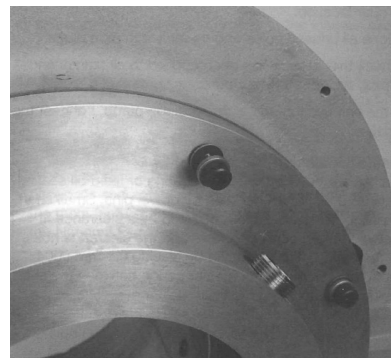


Table 7 - Fixed Oil Seal Joint Shoulder Screw Size and Torque				
Housing Size	Nominal Size	Thread Size	Allen Wrench	Tightening Torque
M-9	6	M5-0.80	3mm	3.2 Nm (28 lb in)
M-11	6	M5-0.80	3mm	3.2 Nm (28 lb in)
M-14	8	M6-1.00	4mm	5.7 Nm (50 lb in)
M-18	8	M6-1.00	4mm	5.7 Nm (50 lb in)

NOTE: See the construction drawing for seal orientation. The seal is normally installed with the joint horizontal and the mounting holes for the displacement probes located $\pm 45^\circ$ from vertical. The seal can be rotated $\pm 45^\circ$ to orient the probe mounts to the right and straight up or to the left and straight up. These are the only 3 orientations allowed for the oil seal because a labyrinth tooth oil drain hole must be located at the bottom centerline. If an air seal is specified on the inboard side of the bearing, the inboard oil seal will be mounted with the joint horizontal and probes installed in the outboard oil seal.



Check that the oil drain holes in the bottom of the lower oil seal half are clear.



Place a thick metal washer, an insulating washer; and 2 drops of Loctite 242 on 2 of the cap screws provided. Loosely mount the oil seal gasket (1/32" or 1mm thick Armstrong N-8092) and oil seal assembly on the inboard side of the housing using only these 2 cap screws assemblies. Insert the screws into the holes that are 22 1/2D below the housing split line.

CAUTION: The insulating washers are to be installed next to the oil seal, preventing contact between the oil seal and the metal washer. The metal washers are 1/8" (3mm) thick. If this washer is lost or damaged, replace with an equivalent or greater thickness of standard washers to prevent damage to the insulating washer.

Align the seal by placing 0.1 mm (0.004 inch) thick shim stock between the shaft and oil seal in 2 places ($\pm 45^\circ$ from vertical in the lower seal half). Lightly press the lower seal half against the shims and tighten the 2 screws in steps to rated torque listed in Table 8. Remove the shims.

An alternate method to align the oil seal is to lightly press the seal assembly up against the bottom of the shaft. Make the clearance at the housing joint equal at both sides to center the seal, then tighten the 2 screws in steps to rated torque listed in Table 8.

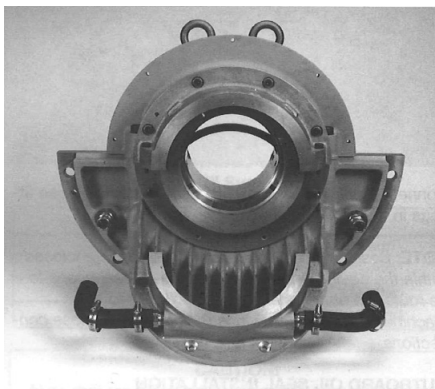
Table 8 - Oil Seal Mounting Screw Size and Torque			
Housing Size	Screw Size	Allen Wrench	Tightening Torque
M-9	M6-1.00	5mm	8 Nm (70 lb-in)
M-11	M6-1.00	5mm	8 Nm (70 lb-in)
M-14	M6-1.00	5mm	8 Nm (70 lb-in)
M-18	M8-1.25	6mm	20 Nm (175 lb-in)

Check that the side clearance of the seal is equal and that the clearance between the top of the oil seal and the shaft is at least 0.005 inches (0.13mm).

Pipe plugs are used to seal the oil seal's vibration probe mounting holes. These plugs must be installed when an air seal is used.

INBOARD AIR SEAL INSTALLATION

Inspect the 3/8" (9.5mm) square graphited packing mounted in the air seal.

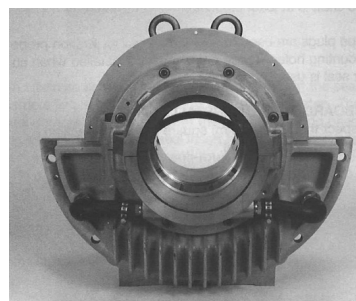


Install the two air seal beaded hose fittings in the lower half of the air seal. Push the two air seal hoses onto the beaded end of the fittings, orienting each hose such that they point toward the corresponding fitting in the lower housing when installed.

Apply Loctite 515 Gasket Eliminator to the air seal upper half joint face. Place 2 drops of Loctite 242 on each joint screw. Be careful not to get any Loctite on the shoulder part of the screw because removal of the screw will be more difficult. Assemble the air seal around the shaft and tighten the screws in steps to the torque value listed in Table 9.

Table 9 - Air Seal Joint Shoulder Screw Size and Torque				
Housing Size	Nominal Size	Thread Size	Allen Wrench	Tightening Torque
M-9	8	M6-1.00	4mm	5.7 N-m (50 lb-in)
M-11	8	M6-1.00	4mm	5.7 N-m (50 lb-in)
M-14	8	M6-1.00	4mm	5.7 N-m (50 lb-in)
M-18	10	M8-1.25	5mm	13.6 Nm (120 lb-in)

Slide the air seal onto the oil seal pilot diameter. Place a thick metal washer, an insulating washer; and 2 drops of Loctite 242 on the remaining 6 cap screws. Insert the screws into the air seal and oil seal and tighten the screws in steps to the torque value listed in Table 7.



Connect the 2 air seal hoses to their respective hose fittings in the lower housing.

NOTE: Designs where the bearing housing is enclosed within the equipment may require the air seal hoses to be routed to atmospheric pressure. Refer to the machine's reference drawings for alternate air hose connections.

OUTBOARD OIL SEAL INSTALLATION

Repeat the previous steps for cleaning, mounting, aligning, and tightening the outboard oil seal.

MISCELLANEOUS INSTRUCTIONS

For disassembly, reverse the assembly instructions.

The housing and liner joints have pry slots to aid disassembly. Jacking screw holes are also provided in the housing cap in the center of each pry slot. The air and oil seal mounting faces each have two jacking screw holes. The thread size of all jacking screw holes is the same as that used to mount the seals.

Two pre-drilled holes are provided in each housing base for doweling the bearing to the mounting structure. See Table 10 for sizes.

Table 10 - Recommended Housing - Machine Dowel Size		
Housing Size	Pilot Diameter	Dowel Diameter
M-9	23/64" (9.1mm)	3/8" (10mm)
M-11	23/64" (9.1mm)	3/8" (10mm)
M-14	29/64" (11.5mm)	1/2" (12mm)
M-18	29/64" (11.5mm)	11/2" (12mm)

Verify that an oil sight glass has been installed in the proper location.

Close all unused holes and threads with pipe plugs. Check that sealant has been applied to all fittings and piping and that they are securely tightened.

If the unit is equipped with a prelube pump, connect the hoses.

Baffle Installation

Baffles are positioned on the floating or fixed oil seal relative to the shaft rather than by dowel pins. Small shaft misalignments are accommodated by a clearance fit between the mounting screws and the clearance holes in the baffle. Align the baffle by placing 0.1 mm (.004 inch) thick shim stock or feeler gauge between the shaft and the baffle in two places (± 450 from vertical in the lower baffle half). Lightly press the baffle against the shims and tighten the screws to the torque rating in Table 11. Place two drops of Loctite 242 on each screw. Repeat the process for the upper half of baffle.

Table 11 - Baffle - Mounting Screw Size and Torque			
Housing Size	Screw Size	Allen Wrench	Tightening Torque
P-9	M5-0.80	4mm	13.6 Nm (28 lb-in)
P-11	M5-0.80	4mm	13.6 Nm (28 lb-in)
P-14	M5-0.80	4mm	13.6 Nm (28 lb-in)
P-18	M5-0.80	4mm	13.6 Nm (28 lb-in)

Temperature Sensors

If a temperature monitoring device (thermocouple or RTD) is specified, install it in the side of the bearing housing lower half as indicated on the construction drawing. Apply Teflon® pipe sealant to the mounting threads. Check that the thermocouple hole in the liner is in line with the thermocouple hole in the housing. If the holes do not line up, either the shaft/bearing misalignment is excessive or the liner has been installed backwards. The wiring should be completed according to the construction drawing.

CAUTION: Ensure that the temperature monitoring device does not compromise the electrical insulation of the insulated bearing assembly.

Vibration Sensors

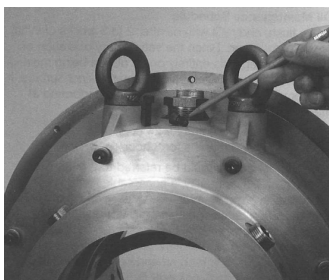
If eddy current displacement probes or seismic sensors are specified, install them in the holes indicated on the construction drawing. Mounting holes are provided 900 apart in the fixed labyrinth oil seals. The M-9, M-11, and M-14 holes are 1/2"-14 NPSF thread size. The M-18 holes are 3/4"-14 NPSF thread size. As mentioned in the seal installation section, the oil seals can be rotated to orient the probes in one of 3 positions.

For access, sensors are normally installed only in the outboard oil seal. Also, an air seal covering the inboard oil seal restricts mounting of probes in the inboard seal.

Heaters

If a heater and thermostat are specified, install them in the indicated holes. The wiring should be completed according to the construction drawing.

WARNING: When installing a heater and thermostat, follow directions and safety procedures recommended by the manufacturer. Install wiring in accordance with the National Electrical Code and local codes.



Electrical Grounding

All bearing housings are electrically insulated. Grounding is determined by the length of the ground screw. Insulated bearings all use a 12mm long socket head cap screw. If a bearing is to be grounded, replace the 12mm long screw with a 40mm long, fully threaded socket head cap screw. See Table 10. This grounding screw is shipped in a bag with the bearing. In either case, clean the threaded hole and screw and dry. Place 2 drops of Loctite 242 on the screw and tighten to the torque value listed in Table 11.

Table 11 - Grounding Screw Size, Length, and Torque				
Housing Size	Grounded	Insulated	Allen Wrench	Torque (Screw & Nut)
M-9	M6-1.00 40mm Long	M6-1.00 12mm Long	5 mm	5 Nm (50 lb in)
M-11	M6-1.00 40mm Long	M6-1.00 12mm Long	5 mm	5 Nm (50 lb in)
M-14	M6-1.00 40mm Long	M6-1.00 12mm Long	5 mm	5 Nm (50 lb in)
M-18	M8-1.25 40mm Long	M8-1.25 12mm Long	5 mm	14 Nm (125 lb in)

It is not necessary to electrically insulate piping attached to the bearing housing, only the temperature monitoring device.

Manometer

Each air seal is provided with two 1/8"-27 NPSI threaded holes at ± 450 from vertical. If desired, these holes can serve as manometer taps to monitor air seal performance.

Oil Level

Remove the oil ring inspection cover in the housing cap and fill bearing with oil so that the oil level is in the center of the oil sight glass. The oil type and viscosity should be indicated on the construction drawing. Replace the oil ring inspection cover.

Table 12 - Housing Oil Sump Capacity	
Housing Size	Approximate Oil Capacity
M-9	2.0 Liters (2.1 Quarts)
M-11	3.9 Liters (4.2 Quarts)
M-14	6.4 Liters (6.8 Quarts)
M-18	11.6 Liters (12.3 Quarts)

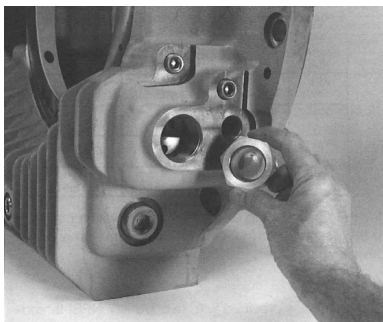
CAUTION: Note that the oil level lowers slightly when the bearing is in operation. Maintain oil level near the center of the oil sight glass when the bearing is in operation.

Circulating Oil

All bearing liners and housings are provided ready to accept externally pressurized oil. An oil distribution groove is machined in one spherical seat of the liner. This groove lines up with the Circulating oil inlet hole in the housing. If they do not line up, it is necessary to remove the liner from the housing and turn it around.

If circulating oil is specified, the inlet and outlet piping should be connected to the holes indicated on the construction drawing.

Proper oil level is maintained by an integral weir cast into the lower housing in the oil sight glass hole. Special pipe sections with weirs are not required.



Drain piping should be vented at the bearing and be of adequate size to drain oil from the bearing at the specified flow rate. The housing drain must be directed straight down into a return drain sloping away at a 15° or greater angle.

Drain lines connect to the housing in the location used for the oil sight glass. Clean the threaded hole and pipe threads with cleaning solvent and dry. Apply Teflon® pipe compound to the pipe threads.

NOTE: Thoroughly clean and flush all piping before connecting piping to the bearing. Change the oil filters. The lubrication system should be functionally tested before the bearing is put into operation.

CAUTION: Under no circumstances may the bearings be connected to the piping while the lubrication system is being purged or flushed.

The oiling system must have a means of filtering the oil to remove any contaminating particles (25 micron filter). Check the construction drawing for the proper piping arrangement.

LUBRICATION AND OPERATION

Since the satisfactory operation of the bearing depends almost entirely on the oil film being maintained between the shaft and bearing liner surface, the use of a high quality oil from a reputable manufacturer cannot be overemphasized. Use a high grade straight mineral oil with rust and oxidation (R & O) inhibitors and anti-foaming agents.

Oil viscosity is determined by the equipment manufacturer and is normally specified on the construction drawing or in the operating manual. Information regarding qualities and properties of specific oils should be referred to the lubricant manufacturer.

Table 13 - Oil Viscosity (If not specified by the equipment manufacturer)		
Room Temp. During Start-Up	Speed	Oil Viscosity Required
Below -10°F (-23°C)	All	Consult Equipment Manufacturer
-1 (10F to 32DF All SAE 10 /ISO 32 (-23°C to 0°C)	All	SAE 10 /ISO 32
32°F to 70°F (0°C to 21°C)	High Low	SAE 10 /ISO 32 SAE 20 /ISO 68
Above 70°F (21 °C)	High High Low	SAE 10 /ISO 32 for Light Loads SAE 20 ISO 68 for Heavy Loads SAE 30 ISO 100

After placing into operation, inspect the bearing to make sure the oil rings are bringing up oil. Operation should be checked frequently during the first few days. Check all connections for oil leaks.

If noise develops, check alignment of housing and all operating parts. Check all points and tighten screws and nuts after several days operation.

Oil Changes

Drain, flush, and refill with oil after 2 to 3 weeks of operation and approximately every 3 months thereafter for 24 hour a day service and every 6 months for 8 hour a day service. Periodically check oil visually for contamination between oil changes. Maintain oil level near the center of the oil sight glass at all times while the unit is in operation.

CAUTION: If heaters are used, be sure heaters are off when oil is removed from the bearing.

Any questions about installation, maintenance, and arrangement of oil connections should be referred to the equipment manufacturer.

NOTE: Bearings should NOT be stored outdoors before installation. For extended or outdoor storage, contact the equipment manufacturer for special precautions against corrosion.

NOTE: Bearings (and shafts) allowed to set idle for extended periods after being run MUST be protected against corrosion. If the unit can not be run for several minutes at least once a week, consult the equipment manufacturer for special lubrication instructions.

Temperature

The bearing temperature will increase after start-up until its normal operating level is reached. Some fluctuation due to ambient temperature change is normal, but a drastic change MUST be investigated. Normal running temperature should not exceed 90°C (194° F). (Check with the equipment manufacturer to see if another operating temperature has been specified.)

Low ambient and operating temperatures can be as harmful to the bearing as high temperatures. A heater and thermoswitch are required for such applications.

Minimum Temperature at Start-Up:

SAE 10 /ISO 32 oil, 45°F (7°C)

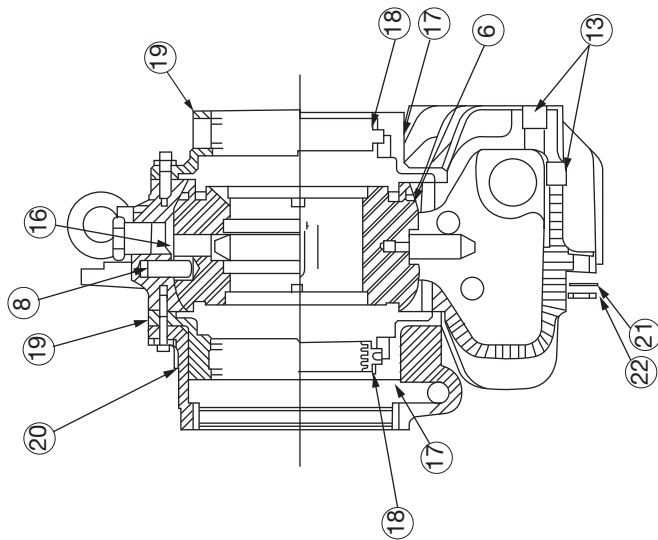
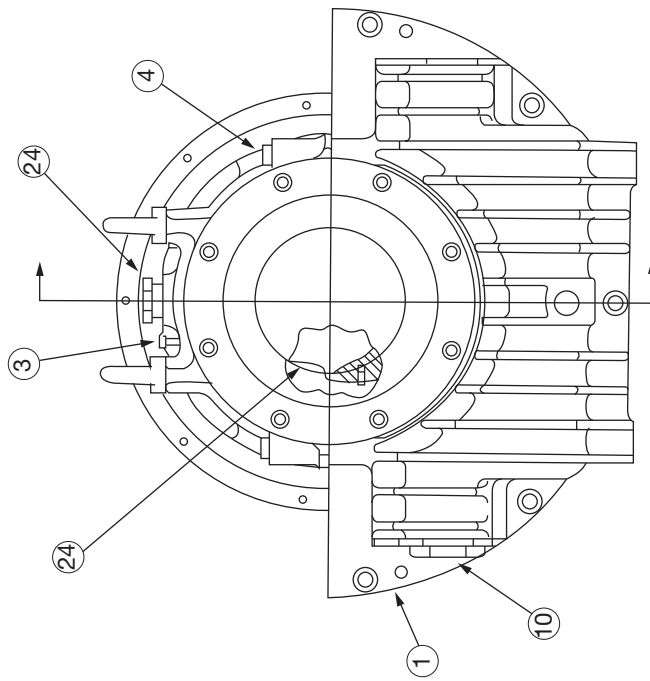
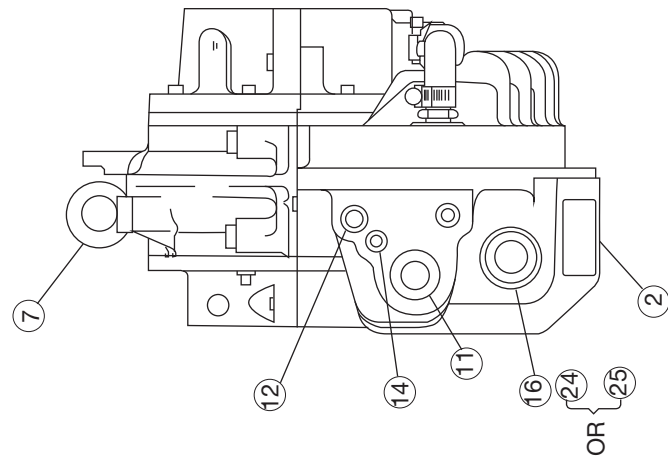
SAE 20 /ISO 68 oil, 70°F (21°C)

SAE 30 /ISO 100 oil, 85°F (29°C)

For Synthetic Oils Consult Dodge or the lubricant manufacturer.

Vibration

Any significant vibration or imbalance MUST be corrected. Check with the equipment manufacturer for acceptable conditions.



M-Series Replacement Parts						
Item	Description	Qty.	Size 9	Size 11	Size 14	Size 18
1	Modular Housing Assembly • with Unribbed Cap ① • with Ribbed Cap ①	1	134400 134401	134402 134403	134404 134405	134406 134407
2	② Nameplate	1	403868	403868	403868	403868
3	② Oil Ring, Smooth ID	1	135378	135379	135380	135381
4	② Cap Screw, Housing	4	411359	411360	417225	411573
5	Grounding Screw ② Grounded Bearing ② Insulated Bearing	1 1	407190 411752	407190 411752	407190 411752	407191 411756
6	② Electrical Insulation	4	135315	134499	135030	134393
7	② Shoulder Eye Bolt	2	415141	415139	415145	415149
8	② Pin, Anti-Rotation	1	135114	135013	135013	420155
9	② Sight Glass, Oil Ring	1	432914	432914	432197	432197
10	② Sight Glass, Oil Level	1	432197	432197	432198	432198
11	② Pipe Plug, Circ. Oil Drain	1	430214	430214	430215	430215
12	② Pipe Plug, Circ. Oil Inlet	2	430031	430031	430031	430033
13	② Pipe Plug, Housing Drain	2	430031	430033	430035	430035
14	② Pipe Plug, Temperature Probe	2	430033	430033	430033	430033
15	② Pipe Plug, Heater / Thermostat	2	430214	430214	430214	430214
16	Bearing Liner ①	1	134412 (80 mm) 134413 (90 mm) 134414 (100 mm)	134415 (100 mm) 134416 (110 mm) 134417 (125 mm)	134418 (125 mm) 134419 (160 mm) 134420 (160 mm)	134421 (160 mm) 134422 (180 mm) 134423 (200 mm)
	② Cap Screw, Joint	4	411575	411575	411575	411713
17	Oil Seal Kit, Floating Labyrinth ① (Standard Seal)	2	135348 (80 mm) 135349 (90 mm) 135350 (100 mm) 135351 (110 mm)	135352 (100 mm) 135353 (110 mm) 135354 (125 mm) 135355 (140 mm)	135356 (125 mm) 135357 (140 mm) 135358 (160 mm) 135359 (180 mm)	135360 (160 mm) 135361 (180 mm) 135362 (200 mm) 135363 (200 mm)
18	② Oil Seal Insert	2	135385 (80 mm) 135386 (90 mm) 135387 (100 mm) 135388 (110 mm)	135387 (100 mm) 135388 (110 mm) 135389 (125 mm) 135390 (140 mm)	135389 (125 mm) 135390 (140 mm) 135391 (160 mm) 135392 (180 mm)	135391 (160 mm) 135392 (180 mm) 135393 (200 mm) 135394 (225 mm)
	② Mounting Screw	8	411575	411575	411351	407191
	② Flat Washer, Steel, 3mm Thick	8	419210	419210	419210	419211
	② Gasket, Oil Seal	1	134386	134387	134388	134389
	Oil Seal Kit, Fixed Labyrinth ① (Optional Seal)	2	134430 (80 mm) 134431 (90 mm) 134432 (100 mm) 134433 (110 mm)	134434 (100 mm) 134435 (110 mm) 134436 (110 mm) 134437 (140 mm)	134438 (125 mm) 134439 (140 mm) 134440 (160 mm) 134441 (140 mm)	134442 (160 mm) 134443 (180 mm) 134444 (200 mm) 134445 (225 mm)
	② Shoulder Screw, Joint	2	411574	411574	411712	411712
	② Mounting Screw	8	411575	411575	411351	411713
	② Flat Washer, Steel, 3mm Thick	8	419210	419210	419210	419211
	② Pipe Plug	2	430033	430033	430033	430035
	② Gasket, Oil Seal	1	134386	134387	134388	134389
20	Air Seal Kit ①	1	134488 (110 mm) 135033 (120 mm) 135034 (130 mm)	134491 (135 mm) 134492 (150 mm) 134493 (160 mm)	134494 (170 mm) 134495 (190 mm) 134496 (200 mm)	134463 (215 mm) 134464 (240 mm) 134465 (250 mm)
	② Shoulder Screw, Joint	2	411714	411714	411714	411719
	② Bushing, Teflon®	8	134384	134384	134384	134385
	② Mounting Screw	6	411352 (4 ea) 411754 (2 ea)	411352 (4 ea) 411754 (2 ea)	411753 (4 ea) 411755 (2 ea)	411718 (6 ea)
	② Pipe Plug	2	430026	430026	430026	430026
	② Packing, Graphited	2	135313	134462	135028	134390
	② Escutcheon Pin	6	409098	409098	409098	409098
	② Hose Fitting, Beaded	4	135320	135320	134391	134391
	② Hose Clamp	4	135010	135010	135010	135010
	② Air Hose	2	135314	135011	135029	134392
	Shim, Housing Mounting Tenon					
21	1.6 mm (.0625 ± .005) Thick	As	135112	134497	135031	134398
22	3.2 mm (.125 ± .005) Thick	Required	135113	134498	135032	134399
23	Oil Dam Kit (per liner)	1	135321	135322	135323	135324
	Oil Dam (per liner)	2	135035	135036	135037	135038
	Button Head Screw (per liner)	2	415099	415099	415099	415099
24	Immersion Heater	1	132835	134992	134994	132839
	Heater Adapter Bushing	1 or 0	430195	None	None	None
25	Thermostat	1	133116	133116	133116	133116
	Thermostat Adapter Bushing	1	430195	430195	430195	430195

① These parts are assemblies and include the parts listed below

② These parts are included in the assemblies under which they are listed.



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