Product Information

Piston Air Motor

Models
50259-4 and -9

Save These Instructions

Form MHD56070
Edition 4
January 2012
71121032

Only allow **Ingersoll Rand** trained technicians to perform maintenance on this product. For additional information contact **Ingersoll Rand** factory or nearest Distributor.

For additional supporting documentation refer to Table 1 'Product Manuals' on page 2.
Manuals can be downloaded from www.ingersollrandproducts.com.
The use of other than genuine **Ingersoll Rand** replacement parts may result in safety hazards, decreased performance and increased maintenance and will invalidate all warranties.
Original instructions are in English. Other languages are a translation of the original instructions.
Refer all communications to the nearest **Ingersoll Rand** Office or Distributor.

Table 1: Product Manuals

Publication	Part/Document Number
Product Safety Information Manual	MHD56312

PARTS ORDERING INFORMATION

These products are designed and constructed to provide long, trouble-free service. In time it may be necessary to order and install new parts to replace those that have been subjected to wear.

For your convenience and future reference, it is recommended that the following information be recorded.

Model Number_____

Serial Number_____

Date Purchase_____

When ordering replacement parts, please specify the following:
1. Complete model number and serial number as it appears on the data (name) plate.
2. Part number(s) and part description as shown in this manual.
3. Quantity required.

The data (name) plate is located on the product.

NOTICE

- **Continuing improvement and advancement of design may cause changes to this equipment which are not included in this manual. Manuals are periodically revised to incorporate changes. Always check the manual edition number on the front cover for the latest issue.**
- **Sections of this manual may not apply to your product.**
- **The use of other than genuine Ingersoll Rand replacement parts may result in safety hazards, decreased performance and increased maintenance, and will invalidate all warranties.**

■ Return Goods Policy

Ingersoll Rand will not accept any returned goods for warranty or service unless prior arrangements have been made and written authorization has been provided from the location the goods were purchased.

Products that have been modified without **Ingersoll Rand** approval, mishandled or overloaded will not be repaired or replaced under warranty. A printed copy of the warranty that applies to this product is provided inside the back cover of the product information manual or in some cases the parts manual.

■ Disposal

When the life of the product has expired, it is recommended that it be disassembled, degreased and parts separated as to materials so that they may be recycled.

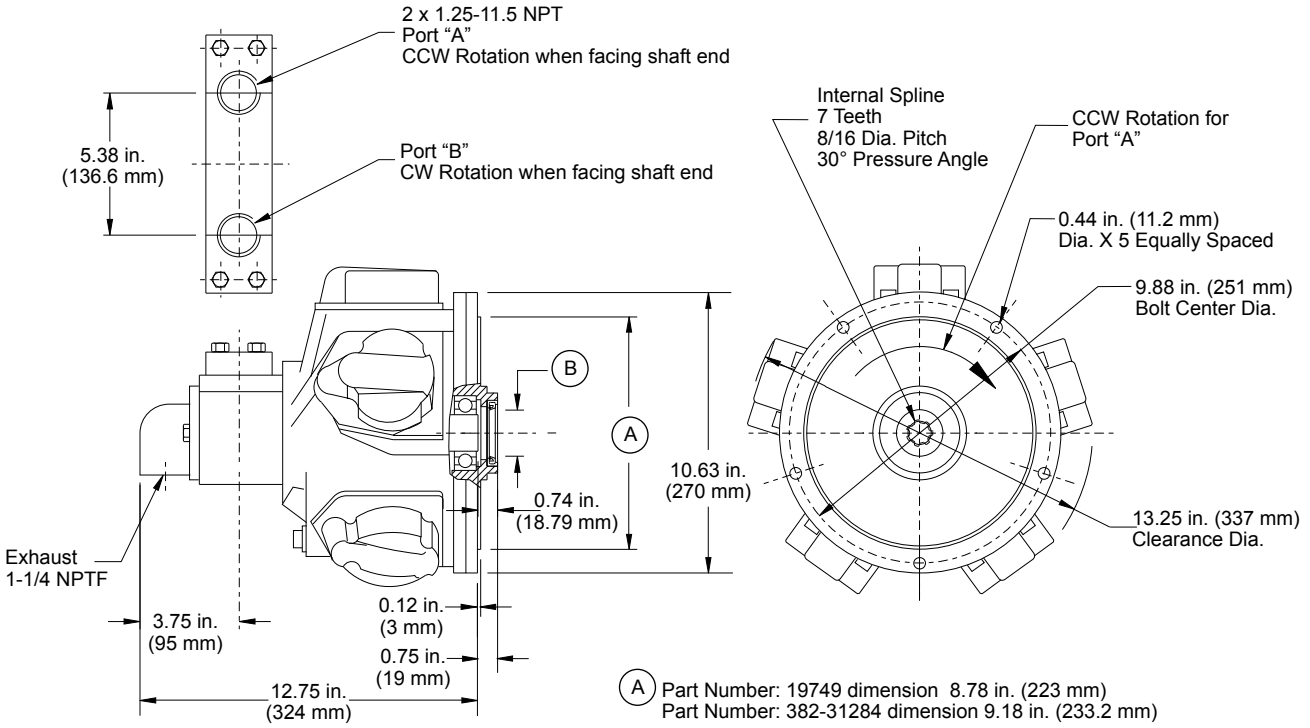
For additional information contact:

Ingersoll Rand
20017 72nd Avenue South
Kent, WA 98032 USA
Phone: (877) 584-0370
Fax: (253) 398-3473

or

Ingersoll Rand
Douai Operations
529, Avenue Roger Salengro
59450 Sin Le Noble, France
Phone: (33) 03-27-93-08-08
Fax: (33) 03-27-93-08-00

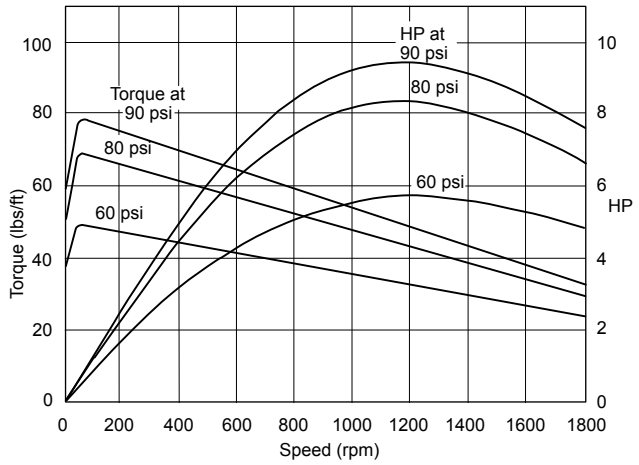
SPECIFICATIONS



(Dwg. MHP0438)

■ Description

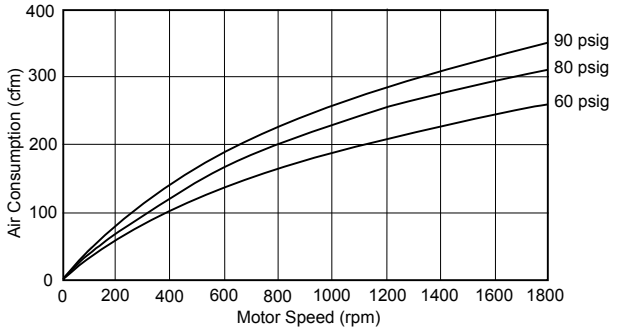
The air motor is a reciprocating, radial 5 piston motor that uses compressed air for a power source up to 110 psig maximum (7.5 bar). The air motor has infinite variable speeds, develops maximum torque at low RPM and can be stalled-started-stopped and reversed without damage.



(Dwg. MHP0445)

■ Air Supply

The motor requires approximately 30 scfm (0.85 cu.m/min) of free air at 100 psig (6.8 bar) to generate one (1) horsepower. Approximately 720 scfm (20.4 cu.m/min) will be required for continuous operation at maximum horsepower.



(Dwg. MHP0446)

INSTALLATION

Prior to installing product, carefully inspect it for possible shipping damage.

⚠ WARNING

- **Product not installed properly may fall or cause a load to fall resulting in sever injury or death. Before installation refer to Product Safety Manual and all safety warnings pertaining to this product.**
- **Product is supplied from factory WITHOUT lubricating oil. Before operation product must be filled with the proper type and quantity of oil recommended in the "LUBRICATION" section "LUBRICATION" on page 5.**

⚠ CAUTION

- **Owners and users are advised to examine specific, local or other regulations, including American Society of Mechanical Engineers (ASME) and/or OSHA Regulations which may apply to a particular type of use of this product before installing or putting product to use.**

■ Mounting

The motor must be mounted in a horizontal position with pipe plugs (464) at the lowest point. If motor is to be mounted at an angle of 10° or more off of horizontal, poor internal lubrication may result. Consult the factory for special instructions. Flange mounted motors can be mounted in either of the following two methods:

Method 1

Provide a mounting with a close fit on the 8.78 in. (223 mm) reference pilot diameter on motor adapter (6). Fasten with five 7/16 in. NC Grade 8 capscrews (93), lockwashers (96) and nuts (if required).

Method 2

Use the 10.63 in. (270 mm) reference outside diameter of motor adapter (6). Fasten with five 7/16 in. NC Grade 8 capscrews (93), lockwashers (96) and nuts (if required).

General Installation Information

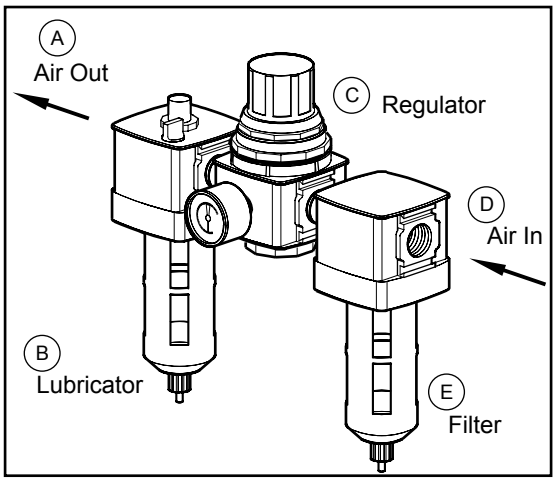
1. It is necessary to provide a bearing for the outer end of motor shaft pinion or shaft extension. Locate it as far from motor as practical and be certain that it is properly aligned.
2. Do not make shaft extensions a tight fit in broached spline of crank. An outboard bearing cannot be perfectly aligned with crank bearings and, therefore, splined fit must serve to a limited extent as a flexible coupling.
3. Motor shaft must be supported in such a manner that no end thrust will be transferred to crank.
4. Consult factory if more detail is needed.
5. Maintain motor in a horizontal position.
6. Remove oil fill/vent cap (462) and oil level plug (464).
7. While pouring oil through the fill hole (462) SLOWLY rotate motor less than 50 RPM.
8. Motor case is full when oil starts flowing out of level hole (464).
9. Reinstall level plug (464) and fill/vent cap (462).

NOTICE

- **Shut off air supply and add 4 oz. (1/4 cup) motor oil to air hose before running motor.**
- **Air supply to motor must be filtered and lubricated at all times or damage to motor will result.**

Air Supply

Supply air must be clean, free of water moisture and lubricated to ensure optimum motor performance. Foreign particles, moisture and lack of lubrication are the primary causes of premature motor wear and breakdown. Using an air filter, lubricator and moisture separator will improve overall motor performance and reduce unscheduled down time.



(Dwg. MHP0191)

Air Lines

The inside diameter of air supply lines must not be smaller than 1 in. (25 mm) based on a maximum of 50 ft. (15 m) between air supply and motor. Contact factory for recommended air line sizes for distances greater than 50 ft. (15 m). Before making final connections, all air supply lines should be purged before connecting to motor inlet. Supply lines should be as short and straight as installation conditions will permit. Long transmission lines and excessive use of fittings, elbows, tees, globe valves etc. cause a reduction in pressure due to restrictions and surface friction in lines.

Lubricator

Always use an air line lubricator with these motors. Use a lubricator having an inlet and outlet at least as large as inlet on motor. Install air line lubricator as close to air inlet of the motor as possible.

NOTICE

- **Lubricator must be located no more than 10 ft. (3 m) from the motor.**

Air line lubricator should be replenished daily and set to provide 4 to 6 drops per minute of the same oil used in motor. A fine mist will be exhausted from exhaust cap (469) when air line lubricator is functioning properly

Filter

It is recommended that an air line strainer/filter be installed as close as practical to motor air inlet port to prevent dirt from entering motor. Strainer/filter should provide 20 micron filtration and include a moisture trap. Clean strainer/filter periodically to maintain its operating efficiency.

Moisture in Air Lines

Moisture that reaches air motor through supply lines is the chief factor in determining length of time between service overhauls. Moisture traps can help to eliminate moisture. Other methods, such as an air receiver which collects moisture before it reaches the motor or an aftercooler at the compressor that cools air prior to distribution through supply lines, are also helpful.

NOTICE

- **The air line oiler is not a substitute for the motor case oil described in the lubrication section. Ensure there is enough oil in air line lubricator prior to using motor to ensure proper rotary valve lubrication.**

OPERATION

The four most important aspects of motor operation are:
1. Follow all safety instructions when operating motor.
2. Allow only people trained in safety and operation of this product to operate motor.
3. Subject each motor to a regular inspection and maintenance procedure.
4. Be aware of motor capacity at all times.

Oil Level Checks

Check oil levels at the following conditions:
1. At temperatures above 32° F (0° C): after motor has been off for several hours or overnight, loosen pipe plug (464) located at bottom of motor case and allow accumulated water to drain out. (Water condensed from air, being heavier than oil, will settle in bottom of motor housing whenever motor is idle).
2. At temperatures below 32° F (0° C): allow motor to remain off long enough for water to separate from oil but not long enough for it to freeze. Actual ambient air temperatures and oil temperature after shutdown will determine how long this will take. Drain water and top up oil level.
3. If procedures 1 and 2 are impractical, drain entire contents from motor case immediately after motor operation ceases.

NOTICE

- **The motor may need to be cranked over slowly (less than 50 RPM) a few revolutions to push oil out of lower two cylinders.**
- **If motor will not be refilled at this time, tag motor and throttle so it will not be used prior to refilling or motor damage will result.**
- **If motor case is not drained in temperatures below freezing, water may eventually accumulate and cause motor to freeze tight.**

INSPECTION

There are two types of inspection, the frequent inspection performed by the operator and periodic inspections performed by personnel trained in the operation and repair of this motor. Careful inspection on a regular basis will reveal potentially dangerous conditions while still in the early stages, allowing corrective action to be taken before the condition becomes dangerous.

Any deficiency revealed through inspection must be reported to an appointed person. A determination must be made as to whether a deficiency constitutes a safety hazard before resuming operation of motor.

■ Records and Reports

Some form of inspection record should be maintained for each motor, listing all points requiring periodic inspection. A written report should be made monthly on the condition of critical parts of each motor. These reports should be dated, signed by the person who performed the inspection, and kept on file where they are readily available for review.

■ Frequent Inspection

Frequent Inspection For motors in continuous service, frequent inspection should be made at the beginning of each shift. In addition, visual inspections should be conducted during regular operation for any damage or evidence of malfunction.

1. **Operation.** Check for visual signs or abnormal noises (grinding etc.) which could indicate a problem. Make sure all controls function properly and return to neutral when released. Do not operate motor until all problems have been corrected.
2. **Air System.** Visually inspect all connections, fittings, hoses and components for indication of air leaks. Repair any leaks found.
3. **Controls.** During operation of motor, verify response to control operation is quick and smooth. If motor responds slowly or movement is unsatisfactory, do not operate motor until problem has been identified and corrected.

■ Periodic Inspection

Frequency of periodic inspection depends on the severity of usage:

Table 2:

NORMAL	HEAVY	SEVERE
Yearly	Semiannually	Quarterly

Disassembly may be required for HEAVY or SEVERE usage. Keep accumulative written records of periodic inspections to provide a basis for continuing evaluation.

Inspect all items in "Frequent Inspection". Also inspect the following:
1. **Fasteners.** Check all capscrews and nuts. Replace if missing or tighten if loose.
2. **All Components.** If motor performance is poor, disassemble motor and inspect for wear, damage, distortion, deformation and cleanliness. Check piston rings, cylinder sleeves, shafts, bearings, housings and covers. Replace worn or damaged parts. Clean, lubricate and reassemble.
3. **Labels and Tags.** Check for presence and legibility. Replace if necessary.

LUBRICATION

Correct lubrication is one of the most important factors in maintaining efficient motor operation. To ensure continued satisfactory operation of the motor, lubrication must be performed at the proper interval:

Start of each shift:
Check flow and level of air line lubricator (approximately 4 to 6 drops per minute required at maximum motor speed). Check oil level in motor after accumulated water has been drained off.

Monthly:
Clean air line filter. Completely drain and refill oil in motor.

Motor is splash lubricated by oil in motor housing and has no other means of lubrication. It is therefore important to use only high quality, non-detergent motor oil to insure maximum performance and minimum repairs. Allow oil to settle prior to topping off. Oil capacity for the motor is 64 fl-oz.

Filling the motor with oil:
1. Motors are shipped without lubricating oil. Prior to operating motor it must be filled to the level of pipe plug (464) with a good quality motor oil or equivalent:

Table 3:

Below 32°F (0° C)	ISO VG32 (SAE 10 W)
32° to 80° F (0° to 26° C)	ISO VG68 (SAE 20 W)
Above 80° F (26° C)	ISO VG100 (SAE 30 W)

MAINTENANCE

⚠ WARNING

- **Shut off air system and depressurize air lines before performing any maintenance. Before performing maintenance, tag controls:**
  WARNING - DO NOT OPERATE
  - EQUIPMENT BEING REPAIRED.
- **Only allow service personnel trained in safety and service on this motor to perform maintenance.**
- **After performing any maintenance on the motor, run the motor slowly in both directions to check operation before returning to service.**

■ Disassembly

Disassembly Refer to Dwg. MHP3231 on page 7.

⚠ WARNING

- **Motor weighs approximately 80 lbs (37 kgs). Provide adequate support before removing mounting capscrews.**

1. Remove lower pipe plug (464) and drain oil into a suitable container. Motor capacity is 64 fl. ozs.
2. Remove capscrews (93), lockwashers (96) and nuts if used. Support the weight of the motor assembly (450) and pull to remove motor from equipment.
3. Remove capscrews (364), lockwashers (363) and exhaust cap (469) from adapter valve (468). Pull out rotary valve (467) and rotary valve bushing (466). Remove adapter valve and manifold plate as an assembly.
4. Remove capscrews (451), copper washers (452) and cylinders (453) from motor housing (463).
5. Rotate crankshaft assembly (473) to bring each wrist pin (457) above the motor housing (463). Push out the wrist pin (457) and remove piston (455). Plugs (456) pressed into ends of wrist pins (457) should not be removed. To avoid breakage use extreme care when removing compression rings (454) from pistons.
6. Remove motor adapter (6) and gasket (470) from motor housing (463).
7. Pull crankshaft assembly (473) with attached connecting rods (459) out of the motor housing (463) by shifting connecting rods (459) to clear the cylinder holes. Connecting rods (459) are joined through a common journal on crankshaft and are held in place by connecting rod rings (474) on each side of main rib.
8. To remove connecting rods (459) from crankshaft (473), loosen setscrew (478) and drive out the taper pin (479) securing counterbalance section to crankshaft section.
9. Loosen capscrew (480), remove counterbalance section, then pull off connecting rod rings (474), connecting rods (459), bushing (476) and sleeve (475).

■ Cleaning, Inspection and Repair

Use the following procedures to clean, inspect, and repair the motor components

■ *Cleaning*

⚠ CAUTION

- **Bearings that are loose, worn or rotate in the housing must be replaced. Failure to observe this precaution will result in additional component damage.**
- **Do not use trichloroethylene to clean parts.**

Clean all component parts in solvent. The use of a stiff bristle brush will facilitate the removal of accumulated dirt and sediments on covers and housing. If gaskets have been removed it may be necessary to carefully scrape old gasket material from matting surface. Dry each part using low pressure, filtered compressed air.

■ *Inspection*

Inspection All disassembled parts should be inspected to determine their fitness for continued use. Pay particular attention to the following:

1. Inspect rotary valve bushing (466) for wear, scoring, or galling. When total clearance between rotary valve bushing and rotary valve (467) exceeds 0.010 in. (0.25 mm) replace rotary valve bushing.
2. Inspect shafts for ridges caused by wear. If ridges caused by wear are apparent on shafts, replace shaft.
3. Inspect all threaded items and replace those having damaged threads.
4. Check mufflers for damage or excessive dirt.
5. Check bearings for freeness of rotation and wear. Replace bearings if rotation is rough or bearings are excessively worn.

■ *Repair*

Actual repairs are limited to the removal of small burrs and other minor surface imperfections from housings, covers and shafts. Use a fine stone or emery cloth for this work.

1. Worn or damaged parts must be replaced. Refer to parts listing for specific replacement parts information.
2. Inspect all remaining parts for evidence of damage. Replace or repair any part which is in questionable condition. The cost of the part is often minor in comparison with the cost of redoing the job.
3. Smooth out all nicks, burrs, or galled spots on shafts, bores, pins, or bushings.
4. Polish edges of all shaft shoulders to remove small nicks which may have been caused during handling.
5. Remove all nicks and burrs caused by lockwashers.
6. Replace all seals, 'O' rings and gaskets.

■ Assembly

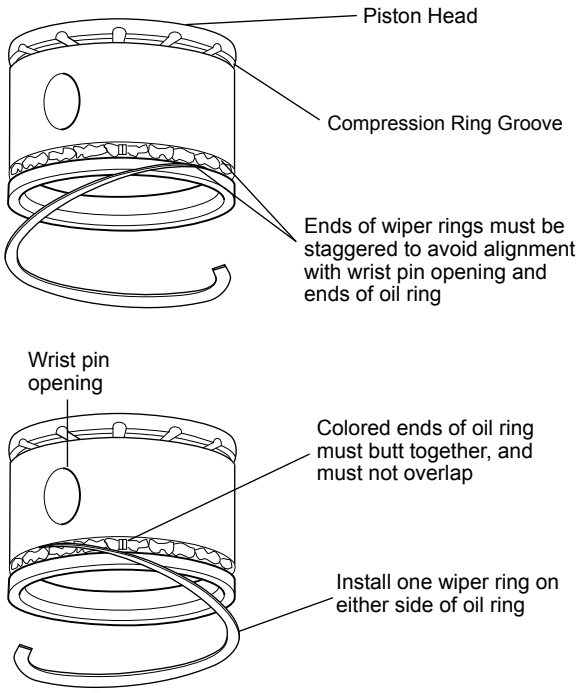
Disassembly Refer to Dwg. MHP3231 on page 7.

1. Press bearing (465) onto crankshaft counterbalance. Place connecting rods (459) on bushing (476) and hold them in place with two connecting rod rings (474). Install connecting rod rings (474) so chamfered side is next to connecting rod (459).
2. Place sleeve (475) on crankshaft (473), then install the connecting rod (459) assembly on crankshaft (473).
3. Secure crankshaft counterbalance to crankshaft with taper pin (479) and tighten capscrew (480). Tighten Setscrews (478).
4. Align bearing (465) in bore of motor housing (463) and tap crankshaft assembly in place until each connecting rod (459) end will project through a cylinder hole.
5. Check fit of each compression (454) and oil ring (458) by placing one ring at a time in cylinder (453), making sure that it is not canted or tilted in relation to cylinder wall. With a feeler gauge, measure ring gap. Ring gap should be 0.003 to 0.004 in. (0.75 to 0.1 mm).
6. Make sure that compression rings (454), oil rings (458), and pistons (455) are perfectly clean. Carefully place oil rings (458) and compression rings (454) in their respective grooves on pistons (455). Plain compression ring (454) must be placed nearest head of piston (455). Oil ring (458) with several oil channels must be placed nearest skirt of piston (455).

NOTICE

- **Do not interchange the compression and oil rings.**

7. Compression and oil ring joints (gaps) should be staggered and positioned so that joints (gaps) do not coincide with wrist pin (457) openings. Refer to Dwg. MHP0224 on page 6.
8. Rotate crankshaft so each connecting rod (459) in succession will project enough beyond motor housing (463) to permit inserting wrist pin (457) through piston (455) and connecting rod (459).
9. After each piston (455) is assembled to its connecting rod (459), install a gasket (460) and cylinder (453).



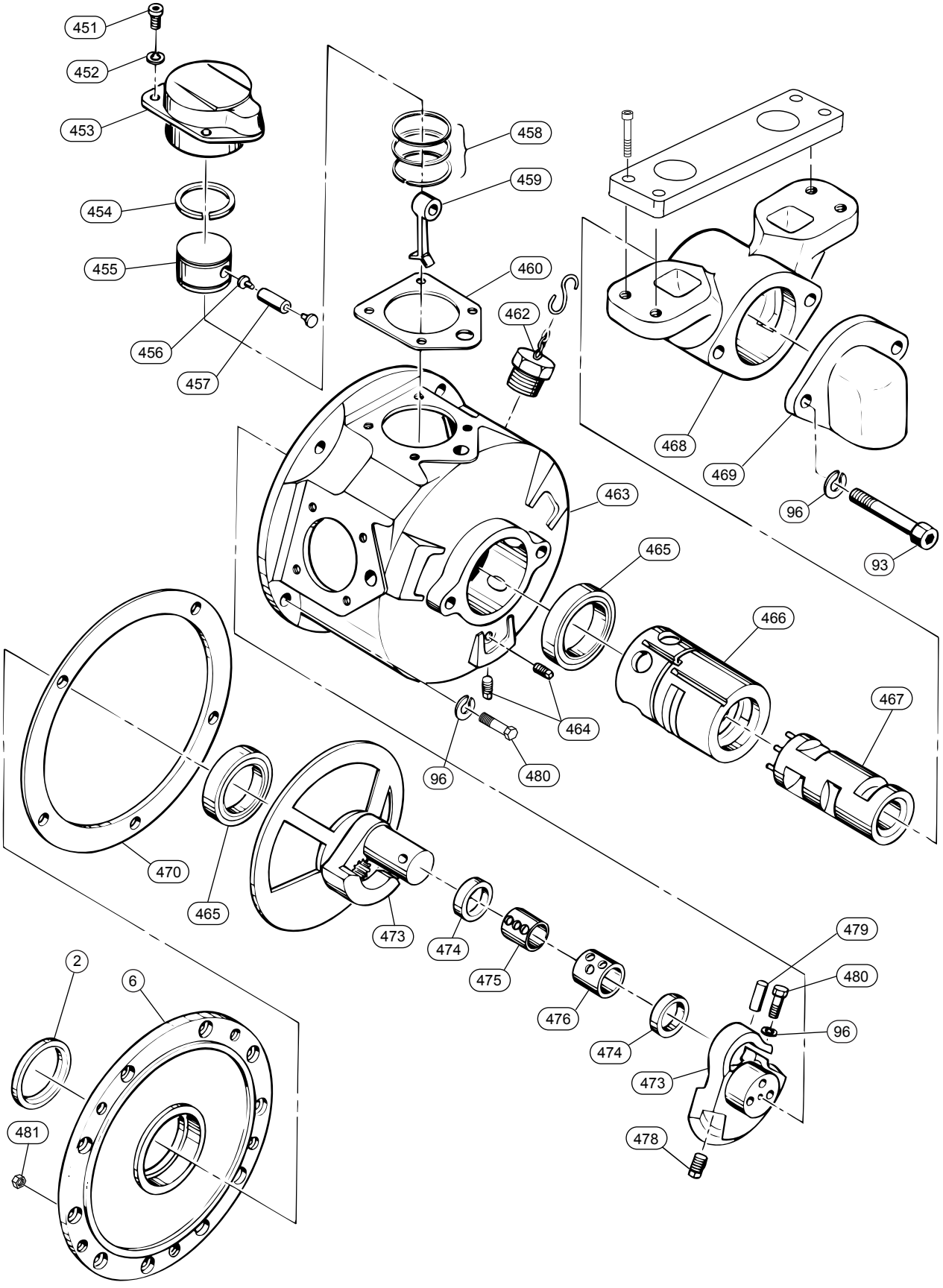
(Dwg. MHP0224)

10. Slide each cylinder (453) over the piston (455), guiding it carefully over compression and oil rings. Note that cylinder has four tapered ears around skirt of piston which serve as ring compressors to aid in installation. Cylinder should fit into place by tapping lightly. If force is required, there may be an alignment problem which must be corrected before continuing.
11. Secure cylinders (453) to motor housing (463) with capscrews (451) and copper washers (452). Tighten capscrews (451) uniformly.
12. Install oil seal (2) in motor adapter (6) with oil seal lip toward motor.
13. Install motor adapter (6) and gasket (470) on motor housing (463) ensure capscrew holes are correctly aligned.
14. Position adapter valve (468) on motor housing (463) and install rotary bushing (466) and rotary valve (467).
15. Install exhaust cap (469). Secure in position with capscrews (364) and lockwashers (363).
16. Fill motor with oil as described in "LUBRICATION" section "LUBRICATION" on page 5.

■ Motor Test

Prior to initial use, all new, extensively repaired, or altered motors should be tested by or under the direction of a person trained in the operation and maintenance of this product, and a written report furnished confirming the results. Run motor slowly in both directions (50 rpm).

MOTOR ASSEMBLY PARTS DRAWING



(Dwg. MHP3231)

MOTOR ASSEMBLY PARTS LIST

Item No.	Description of Parts	Total Qty	Part Number	
			1.25 in. shaft dia.	1.75 in. shaft dia.
450	Motor Assembly	1	50259-4	50259-9
2	Oil Seal	1	71084503	71084503
6	Adapter	1	19749	382–31284
96	Lockwasher	6	50200	
363	Lockwasher	2	51486	
364	Capscrew	2	51488	53539
451	Capscrew	20	71306443	
452	Copper Washer	20	Order one set of 94-027-20	
453	Cylinder	5	94–024	
454	Compression Ring	1 set	Order Kit 71032932	
455	Piston Assembly	5	94–010A	
456	Plug	10	Order 94-011-1A	
457	Wrist Pin Assembly	5		
458	Oil Ring	1 set	Order Kit 71032932	
459	Connecting Rod	5	94-009	
460	Gasket	5	Order one set of 94-025-5	
462	Vent Cap Assembly	1	26604	
463	Motor Housing	1	Not Sold Separately	
464	Pipe Plug	2	50822	
465	Bearing	1	50944	
466	Rotary Valve Bushing	1	10986	
467	Rotary Valve	1	94-019	
468	Adapter Valve	1	10987	
469	Exhaust Cap	1	21-1	
470	Gasket	2	94-029	
471	Manifold	1	17851	
473	Crankshaft Assembly	1	94-001	
474	Connecting Rod Ring	2	94-008	
475	Sleeve	1	94-007	
476	Bushing	1	94-006	
477	Capscrew	4	54240	71126742
478	Setscrew	1	94-005	
479	Pin	1	71126965	
480	Capscrew	3	51712	
481	Nut	2	50198	
**	Data (name) Plate	1	Contact Factory	
	Rivet	4	71028849	
• 484	Service Kit	1	71032932	

SERVICE NOTES

SERVICE NOTES

WARRANTY

Ingersoll Rand Limited Warranty
Ingersoll Rand Company ("**IR**") warrants to the original user its material handling products ("Products") to be free of defects in material and workmanship for a period of one year from the date of purchase. **IR** will, at its option either (1) repair, without cost, any Product found to be defective, including parts and labor charges, or (2) replace such Products or refund the purchase price, less a reasonable allowance for depreciation, in exchange for the Product. Repairs or replacements are warranted for the remainder of the original warranty.

If any Product proves defective within its original one-year warranty period, it should be returned to any Authorized Product Service Distributor, transportation prepaid with proof of purchase or warranty card. This warranty does not apply to Products which **IR** has determined to have been misused or abused, improperly maintained by the user, or where the malfunction or defect can be attributed to the use of non-genuine **IR** repair parts.

IR MAKES NO OTHER WARRANTY, CONDITION OR REPRESENTATION OF ANY KIND WHATSOEVER, EXPRESSED OR IMPLIED, STATUTORY OR OTHERWISE, AND ALL IMPLIED WARRANTIES AND CONDITIONS RELATING TO MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, ARE HEREBY DISCLAIMED.

IR's maximum liability is limited to the purchase price of the Product and in no event shall **IR** be liable for any consequential, indirect incidental or special damages of any nature arising from the sale or use of the Product, whether in contract, tort or otherwise.

Note: Some states do not allow limitations on incidental or consequential damages, so that the above limitations may not apply to you. This warranty gives you specific legal rights and you may also have other rights which may vary from state to state.

Fulcrum series electric winch, product code 405-002: 2 year warranty.

Winch and Hoist Solutions Extended Warranty This option provides a price for extending the **Ingersoll Rand** Winch and Hoist Solutions Warranty from the standard one (1) year to two (2) years from the date of purchase. All other provisions of the standard warranty to remain in effect.

For additional information or quotations for warranties falling outside of these parameters, please contact your Client Services Representative with your requirements.

www.ingersollrandproducts.com