Form P7530
Edition 1
January, 2004
CCN 04578100

Operation and Maintenance Manual for **99RM395/GVSM-31, 99RM396/GVSM-31** and **99RM396/GVSM-43 AIR MOTORS**

NOTICE

The 99RM395/GVSM-31, 99RM396/GVSM-31 and 99RM396/GVSM-43 Air Motors are typically designed to be incorporated into larger machines.

⚠ WARNING

- **IMPORTANT SAFETY INFORMATION ENCLOSED - SAVE THESE INSTRUCTIONS.**
- **Read and understand this manual before operating this product.**
- **It is your responsibility to make this safety information available to others that will operate this product.**
- **Failure to observe the following warnings could result in injury.**

PLACING MOTOR IN SERVICE

- Always install, operate, inspect and maintain this product in accordance with all applicable standards and regulations (*local, state,country,federal, etc.*).
- Always use clean, dry air at 90 psig (*6.2 bar/620 kPa*) maximum air pressure at the inlet. Higher pressure may result in hazardous situations including excessive speed, rupture, or incorrect output torque or force.
- Always turn off the air supply, bleed the air pressure and disconnect the air supply hose before installing, removing or adjusting any accessory on this product, or before performing any maintenance on this product or any accessory.
- Do not lubricate products with flammable or volatile liquids such as kerosene, diesel or jet fuel. Use only recommended lubricants.
- Do not remove any labels. Replace any damaged label.

USING THE MOTOR

- This product is not designed for working in explosive environments, including those caused by fumes & dust, or near flammable materials.
- This product is not insulated against electric shock.
- Keep hands, loose clothing, long hair and jewelry away from working end of product.
- Shaft and/or accessories may briefly continue their motion after throttle is released.
- Never use a damaged or malfunctioning product or accessory.
- Do not modify this product, safety devices, or accessories.
- Do not use this product for purposes other than those recommended.
- Use accessories recommended by Ingersoll-Rand.
- This motor is not designed or sealed to be operated on compressed gas. Use compressed air only.

Refer All Communications to the Nearest Ingersoll-Rand Office or Distributor.

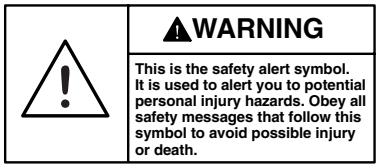
Printed in U.S.A.

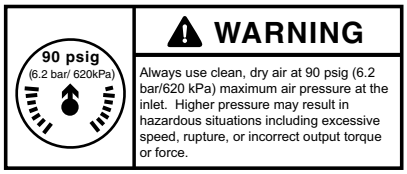
Ingersoll-Rand®

NOTICE

- The use of other than genuine Ingersoll-Rand replacement parts may result in safety hazards, decreased motor performance, and increased maintenance, and may invalidate all warranties.
- Repairs should be made only by authorized trained personnel. Consult your nearest Ingersoll-Rand Authorized Service Center.
- Ingersoll-Rand is not responsible for customer modification of motors for applications on which Ingersoll-Rand was not consulted.

WARNING SYMBOL IDENTIFICATION

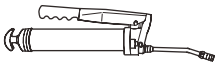




LUBRICATION

Ingersoll-Rand No. 50

Or a good quality
non-detergent
SAE 20 Motor Oil



Ingersoll-Rand Grease No. 10546836

WARNING

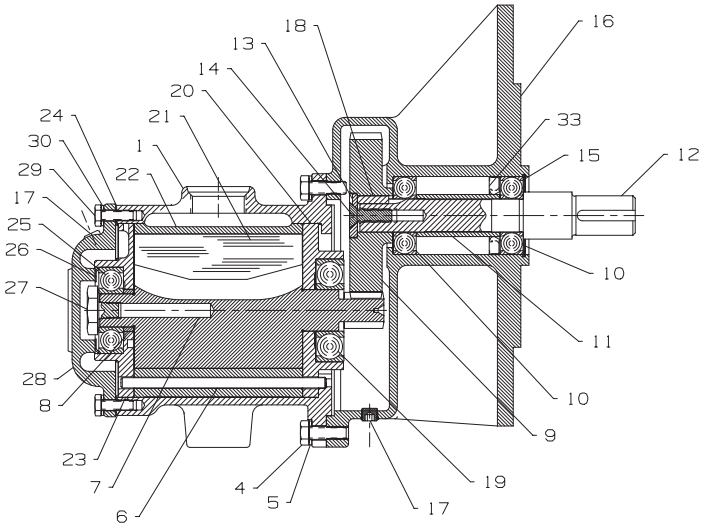
Do not grease excessively; to much grease may cause the gearcase to overheat.

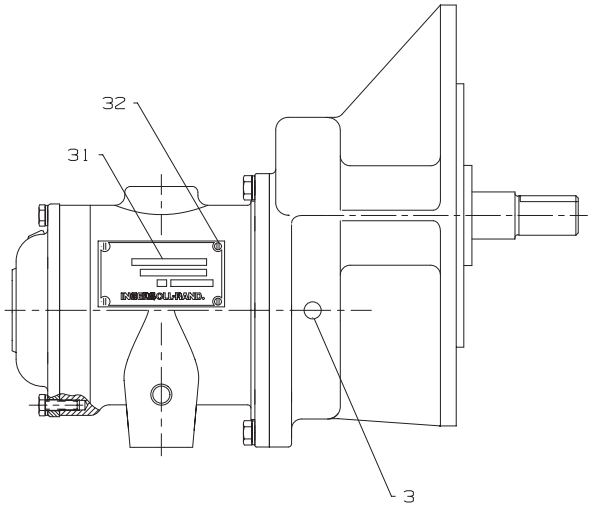
INSTALLATION

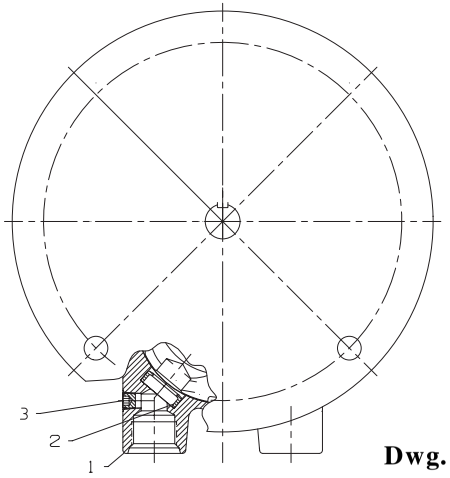
Always use an air line lubricator with these tools.

We recommend the following Unit: **L38-08-LL00-28**

Air Motor 99M39[] / GVSM-[ ]







Dwg. TP1925_00

PARTS LIST

AIR MOTOR 99M39[ ] / GVSM-[ ]

When Ordering, use applicable Part Number

Item	Part Description	Part Number	Item	Part Description	Part Number
01	Motor Housing	VRSM-138	18	Drive Gear Key	9BM-510
02	Air Port Gasket (*2 Required*)	R44H-210A	19	Front Rotor Bearing	10546844
03	Pipe Plug (*3 Required*)	R2-227	20	Front Endplate	9BM-11
04	Housing Cap Screw (*8 Required*)	FM-554	21	Vane (*5 Required*)	R5H-42
05	Housing Cap Screw Lock Wire (*8 Required*)	T11-58	22	Cylinder	577-3
06	Cylinder Dowel	205-1098	23	Rear Endplate	9BM-12
07	Rotor	R55L-53	24	Housing Cover Gasket	9BM-283
	(*Note: 2-Piece Rotor replaced with 1-piece Rotor [Year 1987]*)		25	Rear Rotor Bearing	10546851
08	Rotor Bearing Spacer	R5H-65	26	Rear Rotor Bearing Spring	9BM-278
09	Gear Drive	99RM70-756	27	Rear Rotor Bearing Lock Screw	9BM-119
10	Drive Shaft Bearing (*2 Required*)	JC33501-24	28	Housing Cover	DP991SP-102
11	Drive Shaft Bearing Spacer	99RM61-761	29	Housing Cover Cap Screw (6 Required)	R3-7
12	Drive Shaft	————	30	Housing Cover Cap Screw Lock washer (6 Required)	L01-67
—	99RM395/GVSM-31	99RM91-8	31	Nameplate	9MJ-301
—	99RM396/GVSM-31	99RM92-8		(*Specify Model Number & Serial Number when ordering this item*)	
13	Drive Gear Retainer Washer	9BM-13	32	Nameplate Screw (*4 Required*)	20BM-302
14	Drive Gear Retainer Screw	91RM-126	33	Drive Shaft Seal	99RM91-271
15	Bearing Retainer	FMC2-280	*	Grease (*2 oz. Container*)	10554939
16	Gear case	99RM70-37	*	Joint Sealant	VSM-6225
17	Pipe Plug (*2 Required*)	R2-227	*	Tune-up Kit	10546828

* *Items not Illustrated.*

MAINTENANCE

DISASSEMBLY

⚠ WARNING

- **Always use protective eyewear when performing maintenance on a motor or operating a motor.**
- **Always turn off the air supply and disconnect the air supply line before installing, removing or ajusting any accessories. Failure to do so could result in injury.**

General Instructions

1. Always use protective eyewear when performing maintenance on or operating a Motor.
2. Do not disassemble the motor any further than necessary to replace or repair damaged parts.
3. Do not disassemble the Motor unless you have a complete set of gaskets and o-rings for replacement.
4. Do not remove any part which is a press fit in or on an assembly unless the removal of that part is necessary for repair or replacement.
5. When grasping a motor in a vise, always use leather-covered or copper covered vise jaws to protect the surface of the part or motor and help prevent distortion. This is particularly true of threaded members and housings.
6. Do not remove any part which is a press fit in or on a subassembly unless the removal of that part is necessary for repairs or replacement.

Motor Disassembly

1. Remove the eight Housing Cap Screws (4) along with Housing Cap Screw Lock washers (5). Pull the Motor Housing (1) from the Gear case (16).
2. Remove the two Pipe Plugs (3) from the Motor Housing (1) and drain any oil or grease from the Motor Housing.
3. Remove Pipe Plug (17) from the Housing Cover (28) and drain any oil or grease from the rear of the Assembled Motor.
4. Before removing the Housing Cover (28), be sure to have a new Housing Cover Gasket (24) on hand. Remove the six Housing Cover Cap Screws (29) along with the Housing Cover Cap Screw Lock washers (30). Pull the Housing Cover and Housing Cover Gasket from the Motor Housing.
5. Pull the Rear Rotor Bearing Spring (26) from the rear of the Assembled Motor.
6. Slide the Assembled Motor from the rear of the Motor Housing (1). If necessary the Motor Housing may be need to be tapped with a plastic hammer to remove the Assembled Motor.

Motor Disassembly (*Continued*)

7. Pull the two Air Port Gaskets (2) from the Motor Housing (1) only if necessary and if there are replacements available.
8. Remove the Cylinder Dowel (6) from the Motor Assembly.
9. Place the gear end of the Assembled Motor in vise jaws being careful not to damage the gear teeth of the Rotor (7). Place a wrench on the Rear Rotor Bearing Lock Screw (27) and turn Clockwise to remove it from the Rotor. Remove the Assembled Motor from the vise jaws.
10. Grasp the Cylinder (22) and Front Endplate (20) with the gear end of the Rotor (7) facing up. Holding the Motor Assembly over a work surface, tap the gear end of the Rotor with a plastic hammer until the rear of the Motor Assembly falls from the front of the Motor Assembly.
11. Slide the Front Rotor Bearing (19) from the Front Endplate (20).
12. Pull the five Vanes (21) from the Rotor (7).
13. Support the front face of the Rear Endplate (23) in an arbor press and using a pin large enough to cover the rear hub of the Rotor (7), taking care not to damage the internal threads of the Rotor, press the Rotor through the Rear Endplate.
14. Slide the Rotor Spacer (8) from the Rotor (7).
15. Slide the Rear Rotor Bearing (25) from the Rear Endplate (23).

Gearcase Disassembly

1. Remove the two Pipe Plugs (3) and (17) from the Gear case (16) and drain any oil or grease from the Assembled Gear case.
2. Remove the Drive Gear Retainer Screw (14) from the Drive Shaft (12) and pull the Drive Gear Retainer Washer (13) from the Drive Gear (9).
3. Using a pair of internal retaining ring pliers, remove the Bearing Retainer (15) from the Gear case (16).
4. Place the Assembled Gear case in an arbor press with the Drive Shaft (12) facing down supporting the outer race of the front Drive Shaft Bearing (10), taking care not to damage the threads in the Drive Shaft, press the Drive Shaft out until it is free of the Drive Gear (9). Pull the Drive Gear from the rear of the Gear case (16)
5. Slide the Drive Shaft (12) along with the two Drive Shaft Bearings (10) and Drive Shaft Bearing Spacer (11) and Drive Shaft Seal (33) out the front of the Gear case (16).
6. Remove the Drive Gear Key (18) from the Drive Shaft (12).
7. Using a bearing puller, remove the rear Drive Shaft Bearing (10) from the Drive Shaft (12). Slide the Drive Shaft Bearing Spacer (11) and Drive Shaft Seal (33) off from the rear of the Drive Shaft and remove the front Drive Shaft Bearing from the Drive Shaft.

.

ASSEMBLY

WARNING

- **Always use protective eyewear when performing maintenance on a motor or operating a motor.**
- **Always turn off the air supply and disconnect the air supply line before installing, removing or adjusting any accessory on this motor or before performing any maintenance on this motor. Failure to do so could result in injury.**

General Instructions

1. Always use protective eyewear when performing maintenance on or operating a Motor.
2. Always press on the inner ring of a ball-type bearing when installing the bearing on a shaft.
3. Always press on the outer ring of a ball-type bearing when installing the bearing in a recess.
4. Check each bearing for roughness. If an open bearing must be cleaned, wash it thoroughly in clean solvent and dry with a clean cloth. Sealed bearings should never be cleaned. Work grease thoroughly into every open bearing before installing.
5. Except for bearings, always clean every part and wipe every part with a thin film of oil before installation.
6. When grasping a motor in a vise, always use leather-covered or copper covered vise jaws to protect the surface of the part or motor and help prevent distortion. This is particularly true of threaded members and housings.
7. Apply o-ring lubricant to each o-ring before assembly and use only new gaskets when reassembling the Motor
8. Use only proper cleaning solvents to clean parts. Use only cleaning solvents which meet current safety and health standards. Use cleaning solvents in a well ventilated area

Motor Assembly

1. Support the gear end of the Rotor (7) in an arbor press and slide the Rotor Bearing Spacer (8) onto the hub of the Rotor. Slide the Rear Endplate (23) over the Rotor until it contacts the back face of the Rotor.
2. Start the Rear Rotor Bearing (25) onto the Rotor (7) hub with the writing facing up and using a sleeve that contacts only the inner ring of the Rear Rotor Bearing, press the Rear Rotor Bearing onto the Rotor hub until it contacts the Rotor Bearing Spacer (8).
3. Place the gear end of the Assembled Rotor in vise jaws being careful not to damage the gear teeth of the Rotor (7). Apply three drops of Loctite #271 onto the threads of the Rear Rotor Bearing Lock Screw (27) and thread counterclockwise into the Rotor. Place a wrench on the Rear Rotor Bearing Lock Screw and tighten to between 20-24 ft.-lbs. torque.
4. Slide the Cylinder (22) over the Rotor (7) until it rests against the Rear Endplate (23) and align the Cylinder Dowel holes.

Motor Assembly (*Continued*)

5. Coat the five Vanes (21) with Ingersoll-Rand No. 50 Oil and slip them into the Rotor (7) slots.
6. Support the Rear Rotor Bearing Lock Screw (27) in an arbor press and slide the Front Endplate (20) over the gear end of the Rotor (7) and align the Cylinder Dowel holes.
7. Start the Front Rotor Bearing (19) onto the Rotor (7) hub and using a sleeve that contacts only the inner ring of the Front Rotor Bearing , press the Front Rotor Bearing onto the Rotor hub until it stops. If the Assembled Motor is tight and does not turn smoothly, hold the Cylinder (22) and Front Endplate (23) with the gear end of the Rotor (7) facing up and lightly tap the Rotor with a plastic hammer until the Assembled Motor turns smoothly.
8. Install the two Air Port Gaskets (2) into the Motor Housing (1) until they seat against the bottom of the bore.
9. Place the Motor Housing (1) into a vise with the rear of the Motor Housing facing up.
10. Slide a ¼" x 12.00" long pin into the Cylinder Dowel holes of the Assembled Motor through to the hole in the Motor Housing (1), slide the Assembled Motor into the Motor Housing (1) until the Front Endplate (20) stops against the Motor Housing. Remove the ¼" x 12.00" pin from the Assembled Motor and insert the Cylinder Dowel (6) until it is flush to below the rear surface of the Rear Endplate (23).
11. Set the Rear Rotor Bearing Spring (26) against the Rear Rotor Bearing (25) outer ring.
12. Apply a light film of Ingersoll-Rand Joint Sealant (VSM-6225) to the back face of the Motor Housing (1). Align and place the Housing Cover Gasket (24) onto the rear face of the Motor Housing.
13. Apply a light film of Ingersoll-Rand Joint Sealant (VSM-6225) to the front face of the Housing Cover (28) and place it onto the Housing Cover Gasket (24).
14. Install the six Housing Cover Screw Lock washers (30) onto the Housing Cover Cap Screws (29) and thread into the Motor Housing (1). Tighten to between 20-24 ft.-lbs. torque.
15. Install Pipe Plug (17) into the housing Cover (28) and tighten to between 5-10 ft.-lbs. torque.
16. Install the two Pipe Plugs (3) into the Motor Housing (1) and tighten to between 5-10 ft.-lbs. torque.

Gearcase Assembly

1. Support the front face of the Drive Shaft (12) in an arbor press and using a sleeve that contacts only the inner ring of the front Drive Shaft Bearing (10), press front Drive Shaft Bearing onto the Drive Shaft.
2. Slide the Drive Shaft Bearing Spacer (11) onto the Drive Shaft (12).
3. Coat the outside diameter Drive Shaft Bearing Spacer (11) with a light film of Ingersoll-Rand Grease (10546836) and slip the Drive Shaft Seal (33) over the Drive Shaft Bearing Spacer until it contacts the front Drive Shaft Bearing (10).
4. With the Drive Shaft (12) still supported in the arbor press, using a sleeve that contacts only the inner ring of the rear Drive Shaft Bearing (10), press the rear Drive Shaft Bearing onto the Drive Shaft until it contacts the Drive Shaft Bearing Spacer (11).

Gearcase Assembly (*Continued*)

5. Insert the Drive Gear Key (18) into the Drive Shaft (12) with the rear face of the Drive Gear Key aligned with the rear face of the Drive Shaft.
6. Insert the Drive Gear (9) into the rear of the Gear case (16) so the front of the Drive Gear contacts the rear shoulder face of the Gear case. Slide the assembled Drive Shaft (12) into the front of the Gear case. When the two pieces contact in the rear of the Gear case, align the Drive Gear Key (18) with the keyway in the Drive Gear. Position the Gear case in an arbor press supporting the rear face of the Drive Gear as close to the center of the part as possible and press the front of the Drive Shaft into the Drive Gear.
7. Using a pair of internal retaining ring pliers, install the Bearing Retainer (15) into the front groove of the Gear case (16) to secure the Drive Shaft assembly in the Gear case assembly
8. Assemble the Drive Gear Retainer Washer (13) into the rear of the Drive Gear (9).
9. Apply 3 drops of Loctite #271 onto the threads of the Drive Gear Retainer Screw (14) and thread into the Drive Shaft (12) and tighten to between 20-24 ft.-lbs. torque.
10. Position the assembled Gear case onto the assembled Motor Housing and align the two in the correct orientation. Assemble the eight Housing Cap Screw Lock washers (5) onto their respective Housing Cap Screws (4). Thread the eight Housing Cap Screws into the Gear case (16) and tighten to between 20-24 ft.-lbs. torque.
11 Install Pipe Plugs (3) and (17) into the Gear case (16) and torque to 5-10 ft.-lbs.

NOTICE

SAVE THESE INSTRUCTIONS. DO NOT DESTROY.

When the life of the motor has expired, it is recommended that the motor be disassembled, degreased and the parts be separated by material so that they can be recycled.

Service Centers

Customer Support:
Phone: (866) 474-8665
Fax: (800) 285-0802

Technical Support:
Phone: (866) 866-5457
Fax: (800) 285-0802

Web: *www.irtools.com/techdocuments*

How to obtain regular repair service.
Bring or send the complete tool prepaid to the nearest Service and Parts Distributor listed and state the following information on the packing list.
1. The nature of the trouble.
2. Stipulate if you want an estimate of the cost involved before proceeding with repairs.

How to obtain individual repair parts.
Individual repair parts may be obtained through your nearest Service and Parts Distributor. Please give him the I-R number of your tool and part number and description from the parts list.

How to obtain warranty repair service.
Bring or send the complete tool prepaid to the nearest Service and Parts Distributor listed and state the following information on the packing list:
1. The nature of the trouble or failure.
2. Name and address of Jobber or Distributor from whom you purchased the tool.
3. Date tool was purchased and Proof of Purchase.
4. Application on which tool presently is being used.

United States

Ingersoll-Rand Company
1725 US Highway 1 North
Southern Pines, NC 28387
USA
Tel: (910) 692-8700
Fax: (910) 692-7822

Marketing/Sales Headquarters
Ingersoll-Rand Productivity Solutions
1467 Route 31 South
Annandale, NJ 08801
Tel: (908) 238-7000
Fax: (908) 238-7048

Distribution Center
510 Hester Drive
White House, TN 37188
Telephone: (615) 672-0321
Fax: (615) 672-7679