Turbine Powered Air Starter
150T( ) G Series

Installation and Maintenance Information

Save These Instructions
Product Safety Information

Intended Use:
Series 150(G) Turbine Powered Starters are designed for cranking diesel and natural gas fueled internal combustion engines.

For Additional information refer to Air Starters Product Safety Information Manual Form 45558624. Manuals can be downloaded from www.ingersollrandproducts.com

Operating Guideline

WARNING
When cranking attempts fail to start the engine in 30 seconds, stop and allow the starter to cool for 2-1/2 minutes before attempting to start the engine.

Lubrication

![Lubrication Icon]

80W90 Hypoid Gear Oil  Ingersoll Rand No. 130

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

Specifications

<table>
<thead>
<tr>
<th>Pinion Code</th>
<th>Number of Teeth</th>
<th>Blank</th>
<th>DP/MOD</th>
<th>PD inches</th>
<th>PD mm</th>
<th>PA</th>
<th>Rotation</th>
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<th>OD mm</th>
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<td>5</td>
<td>12</td>
<td>12</td>
<td>8/10</td>
<td>1.625</td>
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<td>20°</td>
<td>R</td>
<td>1.75</td>
<td>44.45</td>
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<td>11</td>
<td>12</td>
<td>6/8</td>
<td>2</td>
<td>50.8</td>
<td>20°</td>
<td>R</td>
<td>2</td>
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<td>11</td>
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<td>50.8</td>
<td>20°</td>
<td>L</td>
<td>2</td>
<td>50.8</td>
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</table>

Other models available. Contact your Ingersoll Rand representative.
Placing the Starter in Service

Installation
Always make certain your air starter is properly installed. For maximum performance, read this manual prior to the installation or operation of Series 150T Turbine-Powered Starters

General Information

1. It is strongly recommended that on all vehicular installations, and on stationary engines subject to vibration, that hoses of the specified diameter be used instead of rigid pipe connections to the starter. Vehicle and engine vibration will soon loosen rigid pipe connections, whereas hoses will absorb the vibration, and connections will remain tight.

2. The starter is designed for either flange, or threaded pipe, mounting at the inlet. The optional Flange Mounting Kit is required for installation. All piping, hoses andvalving must be clean prior to installation. Make sure that the starter inlet remains free of dirt and foreign material during installation.

3. In the actual mounting of a starter, it may be best to have the starter end of the hose handy for attaching to the starter.

4. Engine design often demands that the starter be mounted underneath in extremely close quarters, and even though two of the mounting bolt holes are easy to reach, the third one is often less accessible. To install a starter, the following tools are required: regular ratchet wrench, sockets, universal joint, socket extension and a single or double-end box wrench.

5. The efficiency of an Air Starter can be greatly impaired by an improper hook-up. Hoses smaller than those recommended will reduce the volume of air to the motor and the use of reducers for piped-away applications in the exhaust port will restrict the exhaust causing back pressure to the motor resulting in reduced performance. The number of tees, elbows, and the length of the supply line, should be kept to a minimum. Use 1-1/4” hose or pipe for supply lines up to 15 feet long; uses 1-1/2” hose or pipe if the supply line is over 15 feet long.

6. A leak in any of the connections in live air lines means that the system will drain overnight and will have to be re-pressurized the next morning by use of another vehicle or compressor. Make your connections bubble tight to avoid unnecessary costs and delays. On all threaded connections throughout the system, use Permatex or Loctite®‘ Pipe Sealant. After all connections have been made, check each joint with a soap bubble test. There must be no leaks in inlet or exhaust piping or from any other starter joints. All discharges should be piped away to a safe area.

7. Whenever a hazardous gas is being used to operate the starter, there must be no leaks in inlet or exhaust piping or from any other starter joints. All discharges should be piped away to a safe area.

8. Whenever possible, always mount the air starter so that the exhaust port is pointed downward. This will help prevent any accumulation of water in the starter motor.

9. We recommend installation of a “glad hand” for emergency re-pressurizing of the system. To keep the “glad hand” clean and free of dirt and to protect it from damage, a second “glad hand” closed to the end of the receiver tank as shown in the piping diagram. There must be no leaks in inlet or exhaust piping or from any other starter joints. All discharges should be piped away to a safe area.

10. As an option, a strainer can be installed in the inlet line for each starter. Ingersoll-Rand offers 5 strainers: ST900-267-24 for 1-1/2” lines, ST900-267-32 and ST900-267-32F for 2” lines, ST900-267-48 for 3” lines and ST900-267-64 for 4” lines. These 300 mesh strainers provide 50-micron filtration and offer significant protection against supply line contaminates which could damage the turbine components.

Orientation of the Starter
It is recommended that starters be ordered in the proper orientation for your specific mounting requirements. However, if the starter must be reoriented for installation, proceed as follows:

1. Refer to the dimension illustrations, on pages 3 and 4, and note that the Drive Housing can be located in any one of eighteen radial positions relative to the Gear Case. The exhaust port (Motor Housing) can be located in any one of four radial positions relative to the Gear Case, and the air inlet (Motor Housing Cover) can be located in any one of four radial positions relative to the exhaust port.

2. Study the engine mounting requirements, and determine the required orientation of the Drive Housing relative to the Gear Case. If the Drive Housing has to be reoriented, remove the nine Drive Housing Cap Screws and rotate the Drive Housing to its required position. Separation of the Drive Housing from the Gear Case is not required. Reinstall the Drive Housing Cap Screws and tighten to 100 in-lb (13 Nm) torque.

3. After the Drive Housing is properly oriented relative to the Gear Case, determine if the inlet port will be favorably located for hose installation. If either or both of these members must be reoriented, use a 9/16” wrench to remove the four Motor Housing Cap Screws, and rotate the Motor Housing and/or Motor Housing Cover to the desired position.

NOTICE
Do not separate the Motor Housing from the Intermediate Gear Case, as gear lubrication oil will be lost.

4. Reinstall the Motor Housing Cover Cap Screws and alternately tighten them to 25 ft-lb (34 Nm) torque in 10 ft-lb (14 Nm) increments.

Mounting the Starter

1. Study the appropriate piping diagrams, on pages 5 and 6, and install as indicated.

2. The air receiver tank for a starter installation must have a working pressure rating equal to or greater than the maximum pressure at which the starter will be operated.

3. When connecting the starter to a receiver tank that is already in service, bleed off the air pressure in the tank prior to installing the starter.

WARNING
Bleed off the air pressure through a valve or petcock. Do not remove a plug from the tank while the tank is pressurized. Drain off any water that may have accumulated in the bottom of the tank.

4. Using a 1-1/4” short nipple, install the SRV125 Starter Relay Valve on the end of the receiver tank as shown in the piping diagram.

NOTICE
Make certain the connection is made to the inlet side of the Relay Valve indicated by the word “IN”; cast on the valve body.
5. For air installations, install the Starter Control Valve (SMB-618) on the dash panel (for vehicular installations) or some other appropriate panel (for stationary installations). An optional control circuit, utilizing an electric solenoid control valve and a panel mounted switch, is also available. Mount the appropriate voltage solenoid (ex. 150BMP-1051B for 12VDC) securely and, preferably, in a vertical position away from any concentration of heat, vibration or contamination. Connect the leads to the operator's starting switch, which should be located on the dashboard or control panel.

6. Attach Starter Instruction Label (TA-STR-100) to control panel adjacent to the Starter Control Valve.

7. Mount the Air Pressure Gauge (150BMP-1064) on or adjacent to the control panel. It should be located where it is readily visible to the operator.

8. Connect the Starter Control Valve to the Relay Valve with 1/4” hose. Install a tee in this line with a short feeder hose to the Pressure Gauge.

**NOTICE**

Make certain the hose is connected to the supply side (marked “SUP”) of the Starter Control Valve.

9. To determine the exact length of 1-1/4” air hose required, run a piece of heavy duty hose, or some other flexible tubing of the same diameter, from the Relay Valve on the receiver to the starter location on the engine.

10. Attach the 1-1/4” air hose to the outlet side of the Relay Valve, and run the hose through the frame, etc. to its final position at the starter location.

11. At this point, determine whether or not it is feasible or practical to attach the hose to the starter before or after the starter is actually mounted. In some cases it may be necessary to attach the hose to the starter before mounting.

12. If possible, liberally grease the teeth on the ring gear with a good quality sticky gear grease. This will help promote the life of the ring gear and the starter pinion.

13. Move the starter into position, and mount it on the flywheel housing. Tighten the mounting bolts to 100 ft-lb (136 Nm) torque or to the engine manufacturer’s specifications.

14. If the exhaust is to be piped away, attach appropriate piping to the exhaust outlet on the motor housing.

15. Pressurize the complete starting system and check every connection with a soap bubble test. There must be no leaks in live air lines or other connections.

**NOTICE**

When cranking attempts fail to start the engine in 30 seconds, stop and allow the starter to cool for 2-1/2 minutes before attempting to start the engine.

* Registered Trademark of Loctite Corporation
Installation (Typical Vehicular Installation)

Starter Control Valve
SMB-618 (Brass/Air) SMBG-618 (Chrome/Gas) Solenoid Valve -12 Volt

Air Supply From Dry Air Brake Tank

“Optional Control Circuit Utilizing Electric Solenoid Control Valve and Panel Mounted Switch”

Air Pressure Gauge
150BMP-1064L

Check Valve
150BMP-1056

Drain Valve ½" NPT
150BMP-1067

Air Receiver Tank

JIC 37° Adaptor ¼" NPT
SS350-MC4

Inlet Flange Kit
ST500-K166

Relay Valve 1¼" 
SRV125H

Air Pressure Measuring Port

1¼" Hose

1¼" Pipe

½" NPT Pressure Measuring Port. Operating Pressure not to exceed Max. Pressure Rating stamped on the Starter Nameplate

(© Hose 1/4")

Exhaust Outlet 2" NPT

Exhaust Deflector
ST500-A 735 **

** For Natural Gas Operation Starter Main Exhaust Must be Piped Away

Ingersoll Rand Part Number

Note:
Use Sealant on all Pipe Connections.

(Dwg. TP1930)
Installation (Typical Stationary Installation)

Relief Valve
Set at 15 PSI above Regulator Setting

Starter Control Valve
SMB-618 (Brass/Air)
SMBG-618 (Chrome/Gas)

Air Pressure Gage
150BMP-1064L (Air only)

High Pressure Supply

Pressure Regulator
(Set Regulator so that the open Valve Pressure, Measured at the Starter Inlet, Does Not Exceed the Maximum Operating Pressure Listed on the Starter)

Standard High Pressure System
Air or Gas. Use Pressure Regulator When supply Pressure is over Rating of Starter

For Gas Operation, the Relief Valve Outlet must be Piped Away to a Safe Location

¼" NPT Pressure Measuring Port.
Operating Pressure not to exceed Max. Pressure Rating Stamped on Starter Nameplate

Ingersoll Rand Part Number

** For Natural Gas Operation, Starter Main Exhaust Must be Piped Away
To Pipe the Drive Housing Vent, Remove the Driver Housing Plug and Replace it with a suitable Tubing Line.
The Tubing must Vent at a safe location and must not be interconnected with any other exhaust lines which might introduce a back pressure on the Drive Housing Vent

* SMB-441

Note:
Use Sealant on all Pipe Connections.
Series 150T( ) G Turbine Powered Starter (Cross-section and End Views)

(Dwg. TP1932)
Series 150T( ) G Turbine Powered Starter (Exploded Views)

(Dwg. TP1933)
### Series 150T( ) G Turbine Powered Starter - Part List

<table>
<thead>
<tr>
<th>Item</th>
<th>Part Description</th>
<th>Part Number</th>
<th>Item</th>
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<tr>
<td>1</td>
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<td>Gear Case</td>
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<td>Bearing, Needle Roller</td>
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Maintenance

Always wear eye protection when operating or performing maintenance on this starter. Always turn off the air or gas supply and disconnect the air or gas supply hose before installing, removing or adjusting any accessory on this starter or before performing any maintenance on this starter.

Lubrication

For All Models
1. Lubricate all O-rings with O-ring lubricant before assembly.
2. Fill the intermediate gear case (13) with 55 ml (1.9 fl. oz.) of 80W90 gear oil. Do not overfill.
3. Lubricate the rear motor bearing through the fill plug (32) with 7 ml (0.24 fl. oz.) of 80W90 hypoid gear oil. Do not overfill.
4. Approximately 0.24 kg (8 fl. oz) of Ingersoll Rand No. 130 Grease on the Drive Gear. Do not overfill.
5. Wipe a thin film of Ingersoll Rand No. 11 grease on the Drive Gear Thrust Washer (42).
6. Drive housing and components are lubricated with Ingersoll Rand No. 11 grease during assembly. See assembly instructions for details.

For Models with Inertia Drive

On models with inertia drive, do not lubricate the threaded area of the Drive Shaft (43) as it could collect dirt and foreign material that could impair efficient operation.

Disassembly

General Information
1. Always mark adjacent parts on the Motor Housing Cover (18), Motor Housing (17), Gear Case (13), Offset Gear Case (23) and Drive Housing (44) so these members can be located in the same relative position when the Starter is reassembled.
2. Do not disassemble the starter any further than necessary to replace a worn or damaged part.
3. Do not remove any part, which is a press fit in or on a subassembly unless the removal of that part is necessary for replacement or repairs.
4. Always have a complete set of seals and O-rings on hand before starting any overhaul of a 150T starter. Never reuse old seals or gaskets.
5. When grasping a part in a vise, always use leather-covered or copper-covered vise jaws to protect the surface of the part and help prevent distortion. This is particularly true of threaded members.
6. Never wash the Inertia Drive in a solvent.
7. Do not remove any needle bearing from a press fit unless you have a new needle bearing on hand for installation. Needle bearings are always damaged during the removal process.

Disassembly of the Housing Cover, Motor Assembly, and Motor Housing
1. If replacing the Motor Assembly (6), remove two of the housing plugs (3) and drain the oil from the gearing before beginning disassembly of the starter. Inspect the magnetized portion of the housing Plug (3) for metal particles. Very fine metal particles are normal. Remove particles and reinstall plugs. Repeat for the other two plugs. Large particles or chips are an indication of a problem. If found disassemble the gear case and inspect.
2. Using a 9/16" SAE box or open-end wrench, unscrew and remove the four (4) Starter Assembly Cap Screws (28) and Washers (29).
3. Pull the Inlet Cover (18) from the Motor Housing (17).
4. Remove the drain plug from the rear motor bearing oil reservoir and drain the oil.
5. Holding the Intermediate Gear Case (13), remove the Motor Housing by tapping it on the exhaust outlet with a plastic hammer or mallet. This operation is simplified if the Starter can be positioned on a work bench vertically, resting on the engine mounting flange.
6. Remove the Motor Assembly (6) by grasping the Pinion Gear (16) and pulling the Motor Assembly from the Motor Housing. If difficulty is encountered removing the Motor Assembly place the motor and housing on a suitable support that will allow the Motor Assembly to be dropped out of the housing. Insert a suitable flat-bottomed punch, approximately 3/16" diameter through the oil fill port on the back of the Motor Housing. Lightly tap the punch with a mallet to drive the Motor Assembly out of the housing. It is important to maintain alignment of the punch with the motor during this operation. It is also important to protect the motor from dropping out of the housing unexpectedly.
7. Remove the Intermediate Gear Case (13) by gently tapping it around the circumference, with a plastic hammer or mallet, upward to remove it from the Offset Gear Case.
8. In the event that the Planetary Gear Frame (8) is retained, by the Offset Gear Housing, it must be removed separately. Position two suitable pry bars on opposite side in between the Gear Frame and the Offset Gear Case. Using equal pressure gently lift the Gear Frame out of the Offset Gear Case. The pry bars may have to be repositioned around the circumference several times to complete the task.

Disassembly of the Gear Case
1. Set the Gear Case and Drive Housing unit upright on the workbench with the Drive Housing (44) upward.
2. Remove the Drive Housing Cap Screws (34) and lift off the Drive Housing, Drive Gear and Starter Drive.
3. Thread a 5/16"-18 cap screw into the tapped hole in the Offset Gear Case and drive the Bearing Ejecting Washer out. This will drive the Drive Shaft Rear Bearing from the Offset Gear Case.

Disassembly of the Drive Housing
1. With the Drive Housing unit lying on the workbench, grasp the Drive Gear (27) and pull the assembled Drive Shaft (43) from the Starter Drive (38).
2. If the Drive Gear must be removed from the Drive Shaft, support the Drive Gear on the table of an arbor press, and press the Drive Shaft from the Drive Gear. Remove the Drive Gear Key (35).
3. Stand the Drive Shaft assembly, bearing end up, in a sleeve that contacts the Drive Shaft Collar (40), and press the Drive Shaft from the bore of the Drive Shaft Front Bearing (31).
4. Position the Drive Housing (44) vertically, grasping the Gear Case Cover (36) in leather-covered or copper-covered vise jaws. Tap the underside of the Drive Housing mounting flange with a soft hammer to dislodge the Drive Housing from the Gear Case Cover. Lift off the Drive Housing. The Starter Drive will probably remain with the Drive Housing; make certain that it does not fall on the...
4.  Wipe a thin film of grease on the Drive Gear Thrust Washer (42),

3.  Press the Drive Shaft Rear Bearing (37), unstamped end first, into

2.  Place the Bearing Ejecting Washer (41) in the bearing recess.

1.  Set the Gear Case (23) flat on a table with the Drive Housing side,

Assembly of the Gear Case

6.  Press the Drive Gear (27), long hub first, on the Drive Shaft until it

5.  Install the Drive Gear Key (35) in the keyway on the Drive Shaft.

4.  Press the Drive Shaft Front Bearing onto the keyway end of the

3.  Press the Drive Shaft Collar, beveled end first, onto the keyway

2.  Apply a thin film of moly-base grease to the Drive Shaft (43) and

1.  If the Drive Shaft Grease Seal (22) was removed from the Gear

Assembly

General Instructions

1.  Always press on the inner ring of a ball-type bearing when

2.  Always press on the outer ring of a ball-type bearing when

3.  Whenever grasping a starter or part in a vise, always use

4.  Except for bearings, always clean every part and wipe every part

5.  Check every bearing for roughness. If an open bearing must be

6.  Apply a film of O-ring lubricant to all O-rings before final

7.  Unless otherwise noted, always press on the stamped end of a

Assembly of Drive Gear

1.  If the Drive Shaft Grease Seal (22) was removed from the Gear

2.  Apply a thin film of moly-base grease to the Drive Shaft (43) and

3.  Press the Drive Shaft Collar, beveled end first, onto the keyway

4.  Press the Drive Shaft Front Bearing onto the keyway end of the

5.  Install the Drive Gear Key (35) in the keyway on the Drive Shaft.

6.  Press the Drive Gear (27), long hub first, on the Drive Shaft until it

Assembly of the Gear Case

1.  Set the Gear Case (23) flat on a table with the Drive Housing side,

2.  Place the Bearing Ejecting Washer (41) in the bearing recess.

3.  Press the Drive Shaft Rear Bearing (37), unstamped end first, into

4.  Except for bearings, always clean every part and wipe every part

5.  Check every bearing for roughness. If an open bearing must be

6.  Check every bearing for roughness. If an open bearing must be

7.  Check every bearing for roughness. If an open bearing must be

Inspection of Parts

1.  Discard all O-rings and gaskets. These should not be reused.

2.  Check all grease seals. If these appear worn or distorted, remove

3.  Check all needle bearings. Discard any needle bearing that was

4.  Check all ball bearings. These should run freely without any rough

5.  Do not remove the Drive Housing Bearing (24) from the Drive

6.  Press the Drive Gear (27) and Drive Shaft (43), making

7.  Slide the assembled Gear Case Cover, bearing recess first,

Assembly of the Drive Housing

1.  If the Drive Housing Bearing (24) was removed, stand the Drive

2.  Lubricate the Gear Case O-ring (2) with a thin film of O-ring

3.  Check all needle bearings. Discard any needle bearing that was

4.  Except for bearings, always clean every part and wipe every part

5.  Apply about 0.24 kg (8 oz.) of Ingersoll Rand No. 11 Grease to the

6.  Insert the assembled Drive Gear and Shaft, short hub end first,

7.  Slide the assembled Gear Case Cover, bearing recess first,

Assembly of the Intermediate Gear Case

1.  Position the assembled Drive Housing and Gear Case on a table,

2.  Lubricate the Gear Case O-ring (2) with a thin film of O-ring

3.  Position the assembled Drive Housing and Gear Case on a table,

4.  Place the Offset Gear Pinion (26) onto the shaft of the Gear Frame

5.  Install the Pinion Retaining Ring (7) in the groove on the rotor

6.  Install the Drive Housing Cap Screws (34) and Lock Washers (39)

7.  Slide the assembled Gear Case Cover, bearing recess first,

8.  Place the Gear Frame Assembly (8).

9.  Position the assembled Drive Housing and Gear Case on a table,

10.  Wipe a thin film of grease on the Drive Gear Thrust Washer (42),

11.  Where the Seal faces the bearing recess for the Drive Shaft Front Bearing.

12.  Once the Starter has been disassembled, clean all parts for

13.  If the Drive Shaft Grease Seal (22) was removed from the Gear

14.  Discard the assembly.

15.  Always press on the inner ring of a ball-type bearing when

16.  Discard all O-rings and gaskets. These should not be reused.

17.  Always press on the outer ring of a ball-type bearing when

18.  Always press on the inner ring of a ball-type bearing when

19.  Discard any needle bearing that was

20.  Check all ball bearings. These should run freely without any rough

21.  Discard any needle bearing that was

22.  Discard any needle bearing that was

23.  Discard any bearing that gives any indication of

24.  Discard any bearing that gives any indication of

25.  Discard any bearing that gives any indication of

26.  Do not remove the Drive Shaft Grease Seal (22) from the Gear

27.  Do not remove the Drive Housing Bearing (24) from the Drive

28.  Do not remove the Drive Housing Bearing (24) from the Drive

29.  Do not clean the Starter Drive (38) with solvent. If Starter

30.  Do not wash these parts in kerosene or other solvent, as

31.  Do not clean the Starter Drive (38) with solvent. If Starter

32.  Do not clean the Starter Drive (38) with solvent. If Starter

33.  Do not clean the Starter Drive (38) with solvent. If Starter

34.  Do not remove the Drive Shaft Grease Seal (22) from the Gear

35.  Do not remove the Drive Housing Bearing (24) from the Drive

36.  Do not remove the Drive Housing Bearing (24) from the Drive

37.  Do not remove the Drive Housing Bearing (24) from the Drive

38.  Do not remove the Drive Housing Bearing (24) from the Drive

39.  Do not clean the Starter Drive (38) with solvent. If Starter

40.  Do not clean the Starter Drive (38) with solvent. If Starter

41.  Do not clean the Starter Drive (38) with solvent. If Starter

42.  Do not clean the Starter Drive (38) with solvent. If Starter

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58.  Do not clean the Starter Drive (38) with solvent. If Starter

59.  Do not clean the Starter Drive (38) with solvent. If Starter

60.  Do not clean the Starter Drive (38) with solvent. If Starter
6. Position the Gear Frame Assembly (8) by locating the outer race of the small bearing in the bearing seat in the Offset Gear Case (23). Care must be taken not to damage the O-ring in the Offset Gear Case during this operation.


8. Set the Intermediate Gear Case on the Offset Gear Case making certain the punch marks on both Gear Cases are aligned.


10. Fill the Intermediate Gear Case, through the exposed open end, with 55 ml (1.9 fl. oz.) of 80W90 gear oil. Do not overfill.

Assembly of Motor Housing

1. Before installing the Motor Assembly (6), coat the Orings on the Motor Assembly and the inside of the Motor Housing bore with O-ring lubricant. Position the Motor Housing with the main bore opening in the vertical position. Carefully slide the Motor Assembly down into the housing, with the geared shaft pointing out. It is important to slide the motor assembly in as straight as possibly to prevent a cut O-ring. When properly seated in the motor housing the front exhaust passage, in the housing, should be completely visible.

2. Attach the Gear Pinion (16) to the Motor Shaft. Install the Gear Pinion Retaining Ring (15). Be careful not to expand the Gear Pinion Retaining Ring any more than necessary to fit it to the shaft. Be sure the retaining ring is fully seated in the groove.

Test and Inspection Procedure

1. **Clutch Ratcheting:** Turn the Drive Pinion (38) by hand in the direction of Starter Rotation. The Pinion should advance smoothly and easily to the stop.

2. **Motor and Gearing Freeness:** Turn the Drive Pinion (38) opposite the direction of Starter rotation. The Drive Pinion should turn by hand.

3. **Motor Action:** Attach an air hose to the inlet and operate the motor slowly to see that it functions properly and that the Drive Pinion rotates in the proper direction. If the direction of rotation is incorrect, the motor was improperly assembled.

4. **Pinion Orientation:** The chamfers on the pinion teeth should be on the following side of the teeth.

5. **Leak Inspection:** Plug the exhaust. Connect air line to the inlet, regulate the air pressure to 40 psig (2.8 bar/280 kPa) and immerse the unit for 30 seconds in light oil, or non-flammable solvent. If there are any bubbles, the unit is unfit for gas operation. Tighten where necessary and/or apply sealant to area showing leak. Retest.

Parts and Maintenance

**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. Ingersoll Rand is not responsible for customer modification of motors for applications on which Ingersoll Rand was not consulted.

Repairs should be made only by authorized trained personnel. Consult your nearest Ingersoll Rand Authorized Service center.

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

Manuals can be downloaded from www.ingersollrandproducts.com

Refer all communications to the nearest Ingersoll Rand Office or Distributor.