



16572679
Edition 2
May 2014

Air Drill QP Series

Maintenance Information



Save These Instructions

IR *Ingersoll Rand*[®]

Product Safety Information

WARNING

- Failure to observe the following warnings, and to avoid these potentially hazardous situations, could result in death or serious injury.
- Read and understand this and all other supplied manuals before installing, operating, repairing, maintaining, changing accessories on, or working near this product.
- Always wear eye protection when operating or performing maintenance on this tool. The grade of protection required should be assessed for each use and may include impact-resistant glasses with side shields, goggles, or a full face shield over those glasses.
- Always turn off the air supply, bleed the air pressure and disconnect the air supply hose when not in use, before installing, removing or adjusting any accessory on this tool, or before performing any maintenance on this tool or any accessory.

Note: When reading the instructions, refer to exploded diagrams in parts Information Manuals when applicable (see under Related Documentation for form numbers).

Lubrication

Each time a Series QP Drill is disassembled for maintenance and repair or replacement of parts, lubricate the tool as follows:

1. Coat all exposed gears with **Ingersoll Rand No. 67 Grease** and work some of the Grease into the gearing of the Spindle Assembly (29).

2. Use **Ingersoll Rand No. 10 Oil** to lubricate the motor. Inject approximately 1 to 2 cc of oil into the air inlet before attaching the air hose to the tool.

Speed Adjustment

Series QP Drills are furnished with the ability to precisely control, within certain ranges, the optimum drilling speed for exotic materials. Setting the speed requires a tachometer and a jeweler's screwdriver. Therefore, the adjustment, although simple, should only be attempted by a competent technician using the proper equipment.

A small, round opening is located adjacent to the Inlet Bushing Assembly (4) in the molded exhaust vent. A tiny screw at the bottom of that hole controls the location of the exhaust control plate. Take an initial reading of the tool speed by applying a tachometer to the end of the Chuck without a drill bit and with the trigger completely depressed. If the tachometer has a concave tip, close the chuck completely; if the tip is convex, open the chuck completely.

After determining the actual velocity, shut off the air supply and insert a small jeweler's screwdriver into the slot of the exhaust control plate screw and rotate the screw approximately fifteen degrees. Restore the air supply and check the velocity again. The control plate provides unrestricted exhaust for 90 degrees, completely restricted exhaust for 90 degrees and variable, adjustable exhaust for 180 degrees. Determine which direction you need to rotate the screw to obtain the desired speed and then move the screw accordingly. Best results are achieved by using gradual increments and frequent tachometer readings. Be sure to turn off the air supply when making adjustments to the screw.

Disassembly

General Instructions

1. Do not disassemble the tool any further than necessary to replace or repair damaged parts.
2. Whenever grasping a tool or part in a vise, always use leather-covered or copper-covered vice jaws to protect the surface of the part and help prevent distortion. This is particularly true of threaded members and housings.
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 repairs or replacement.
4. Do not disassemble the tool unless you have a complete set of gaskets and O-rings for replacement.

Disassembly of the Tool

Each Series QP Drill is made up using three modules or units which include a housing and throttle unit, a motor unit and a combined gearing and spindle unit. The tool can be disassembled for repairs to each individual unit without disturbing the other units. To separate the modules, proceed as follows:

1. Remove the Chuck (35) using the following technique:
 - a. Insert the short leg of a 1/4" hex wrench into the jaws of the Chuck and tighten the Chuck.
 - b. Using a brass hammer, sharply rap the long leg of the wrench in a counterclockwise direction to loosen the Chuck.
 - c. Unscrew and remove the Chuck from the spindle.
2. To separate the Gear Case (30) from the Housing (1), proceed as follows:
 - a. Install a standard 1-1/16" open end wrench on the flats of the Gear Case.
 - b. Grasp the handle portion of the Motor Housing and rotate

the Housing counterclockwise to begin unscrewing it from the Gear Case.

- c. When the Housing begins to turn freely, remove the wrench from the Gear Case and with the spindle upward, finish unscrewing the Housing from the Gear Case.
 - d. Set the assembled Gear Case on the workbench.
3. Remove the Motor Clamp Washer (21) and the Motor Seal (20) from the assembled motor in the Housing.
 4. Grasp the shaft of the Rotor (15) and pull the assembled motor out of the Motor Housing.
 5. To remove the throttle unit, grasp the hex of the Inlet Bushing Assembly (4) in vise jaws with the Motor Housing upward.
 6. Using the Inlet Retainer Removal Tool (37), depress the two tabs on the Inlet Bushing Retainer (7), located 180 degrees apart, while pulling the Housing off the Inlet Bushing Assembly.
 7. If the Inlet Bushing Seal (8F) remained in the Housing when the Inlet Bushing Assembly was removed, remove it from the Housing.

Disassembly of the Gearing

1. **For Series QP05, QP09, QP15, QP20 and QP38**, using snap ring pliers, remove the Gear Retainer (22) from inside the Gear Case (30) and remove the Gear Head Spacer (23).
2. **For Series QP38**, lightly rap the motor end of the Gear Case on a wooden work bench top to remove the Planet Gear Head Drive Plate (24), Planet Gear Head Assembly (25) and the Planet Gear Head Spacer (28).

For Series QP05 and QP09, lightly rap the motor end of the Gear Case on a wooden work bench top to remove the three Planet Gears (26), the Planet Gear Head Assembly (25) and the Planet Gear Head Spacer (28).

For Series QP15 and QP20, lightly rap the motor end of the Gear Case on a wooden work bench top to remove the three Planet Gears (26), the Rotor Pinion (27), the Planet Gear Head Assembly (25) and the Planet Gear Head Spacer (28).

NOTICE

If the Spindle Assembly is being removed or replaced, the Spindle Bearing and Spindle Cap Bearing may be damaged during the removal process. We recommend that new replacement bearings be available for installation when the tool is reassembled.

- Stand the Gear Case on the table of an arbor press with the threaded end of the Spindle Assembly (29) upward. Using a rod slightly smaller than the spindle shaft, press the Spindle Assembly out of the Spindle Cap Bearing (34) and Spindle Bearing (31).
- Insert a long, small drift through the central opening of the Spindle Bearing and push the Bearing Spacer (32) off to one side. Using a hammer with the drift, tap the inner ring of the Spindle Cap Bearing. Repeat the process at several points until the Bearing is free from the Gear Case. Remove the Bearing Spacer from the Gear Case.
- Using snap ring pliers, remove the two Bearing Stops (33).
- Stand the Gear Case on the table of an arbor press with the threaded end upward, and press the Spindle Bearing out of the Gear Case.

Disassembly of the Motor

- Using snap ring pliers, remove the Rear End Plate Assembly Retainer (12) and slide the Rear End Plate Assembly (11) off the rear hub of the Rotor.
- Use a piece of leather or other protective material to grasp the splined shaft of the Rotor and pull the assembled Rotor out of the

Cylinder (13).

- Remove the Vanes (16) from the Rotor.
- Support the Front End Plate Assembly (17), as near the rotor body as possible, on the table of an arbor press and press the Rotor from the Front Rotor Bearing (19). Remove the Bearing from the Front End Plate.

Disassembly of the Throttle Mechanism

- Grasp the hex of the Inlet Bushing Assembly (4) in leather-covered or copper-covered vise jaws with the end having the Inlet Bushing Screen (5) downward.
- Remove the Inlet Bushing Seal (8F) from the Inlet Bushing Assembly.
- Using snap ring pliers, remove the Valve Seat Retainer (8E) and the Valve Seat Support (8D) from the Bushing.
- Using a hooked tool without sharp edges or points, remove the Throttle Valve Seat (8C) from inside the Bushing.
- Remove the Throttle Valve (8A) and Throttle Valve Spring (8B) from the Bushing.
- If the Inlet Bushing Screen is dirty, flush it clean using a clean, suitable, cleaning solution in a well ventilated area. Remove the Screen only if it is damaged or as a last resort and have a replacement Screen on hand whenever removal becomes necessary. Use the eraser end of a pencil to push it out the inlet end of the Bushing.
- If the Inlet Bushing Bezel (6) needs replacement, slightly spread the Inlet Bushing Retainer (7) and push it off the side of the Bushing. Slide the Bezel off the Bushing.
- To remove the Trigger Assembly (3A), insert a long probe with a small hook into the opening for the Inlet Bushing Assembly in the Motor Housing (1) and hooking the Trigger Retainer (3B), pull the Retainer out of the Housing. Pull the Trigger out of the Housing.

Assembly

General Instructions

- Always press on the **inner** ring of a ball-type bearing when installing the bearing on a shaft.
- Always press on the **outer** ring of a ball-type bearing when pressing the bearing into a bearing recess.
- Whenever grasping a tool or 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 and housings.
- Except for bearings, always clean every part and wipe every part with a thin film of oil before installation.
- Apply o-ring lubricant to all O-rings before final assembly.
- Check every bearing for roughness. If an open bearing must be cleaned, wash it thoroughly in a clean, suitable cleaning solution and dry with a clean cloth. **Sealed or shielded bearings should never be cleaned.** Work grease into every open bearing before installation.

Assembly of the Throttle Mechanism

- If the Trigger Assembly (3A) was removed, insert the shaft of the Trigger into the Motor Housing (1) and push it all the way into the trigger recess in the Housing until it stops.
- Using long reach needle nose pliers to hold the Trigger Retainer (3B), insert the Retainer into the inlet bushing opening and install the straight leg of the Retainer in the hole through the shaft of the Trigger.
- Install the Inlet Bushing Bezel (6), convex end leading, onto the Inlet Bushing Assembly (4). Bring the convex end into contact with the hex at the inlet end of the Bushing.
- Spread the opening slightly on the Inlet Bushing Retainer (7) and install it around the Inlet Bushing with the tab end nearest to the bushing hex and against the Bezel.
- Grasp the hex of the Inlet Bushing in leather-covered or copper-

covered vise jaws with the throttle valve opening upward.

- Insert the Throttle Valve Spring (8B), large end leading, followed by the Throttle Valve (8A), long stem end trailing, into the valve opening.
- Place the Throttle Valve Seat (8C) followed by the Valve Seat Support (8D) in the opening against the Valve.
- Using snap ring pliers while compressing the Throttle Valve Spring and moving the Seat and Support inward, capture the components by installing the Valve Seat Retainer (8E) in the Bushing internal groove.
- Moisten the Inlet Bushing Seal (8F) with o-ring lubricant and install it on the exterior of the Inlet Bushing.
- Remove the assembled Bushing from the vise jaws. If the Inlet Bushing Screen was removed, use a flat faced dowel slightly less than 1/2" in diameter to push the new Screen into the opening at the hex end of the Bushing.

Assembly of the Motor

- Place the Front End Plate (17) on the splined shaft of the Rotor (15) with the bearing recess away from the rotor body.
- Place the Front Rotor Bearing (19) onto the shaft and using a sleeve or piece of tubing that contacts the inner race of the Bearing, press the Bearing onto the shaft until the Front End Plate nearly contacts the rotor body.

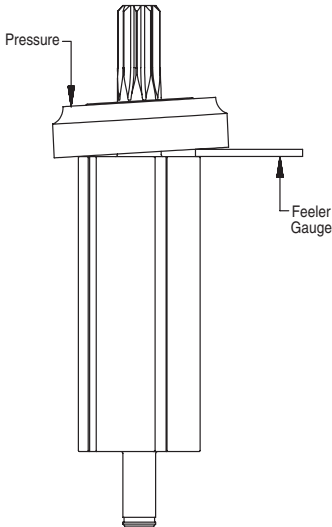
NOTICE

In the following step, the measurement must be made at the end corner of the large rotor body.

- The clearance between the Front End Plate and Rotor is critical. While pressing down with your finger on the outer edge of the Front End Plate on the bearing side, insert a 0.004" (0.1 mm) feeler gauge between the face of the rotor body and the face of the End Plate at a point that is 180 degrees from where the pressure is

applied. Refer to Dwg. TPA1740. To increase the gap, support the End Plate and lightly tap the rotor shaft with a plastic hammer; to decrease the gap, press the Bearing farther onto the rotor shaft.

Measurement of Front End Plate Clearance



(Dwg. TPA1740)

4. Wipe each Vane (16) with a light film of **Ingersoll Rand** No. 10 Oil and place a Vane in each slot in the Rotor.
5. One end of the Cylinder Assembly (13) has a notch that breaks the outer wall and end face of the Cylinder. With that end trailing, install the Cylinder Assembly over the Rotor and Vanes against the Front End Plate. Make certain the Cylinder Alignment Pin (14) enters the hole in the Front End Plate.
6. Install the Rear End Plate Assembly (11), flat face leading, on the rear hub of the Rotor. Make certain the Cylinder Alignment Pin enters the hole in the Rear End Plate.
7. Using snap ring pliers, install the Rear End Plate Assembly Retainer (12) in the annular groove on the rear rotor hub to secure the assembly in position.
8. Set the assembled motor aside.

Assembly of the Gearing

1. Work some **Ingersoll Rand** No. 67 Grease into the gearing of the Spindle Assembly (29).
2. Insert the threaded end of the Spindle Assembly into the threaded end of the Gear Case (30) while meshing the teeth of the gears with the spline inside the Gear Case.
3. Support the gear end of the Spindle Assembly on the table of an arbor press while leaving clearance for the Gear Case. Using a piece of tubing that will clear the shaft and contact the inner ring of the Spindle Bearing (31), press the Bearing onto the shaft of the Spindle Assembly until it contacts the gear hub.
4. Using snap ring pliers, install one of the Bearing Stops (33) in the internal groove nearest the Bearing.
5. Apply some **Ingersoll Rand** No. 67 Grease to the Bearing Spacer (32) and slide it onto the shaft of the Spindle Assembly with the smaller end trailing.
6. Using snap ring pliers, install the second Bearing Stop in the internal gear case groove nearest the threaded spindle end.
7. Stand the assembled Gear Case on the table of an arbor press with the output Spindle upward. Install the Spindle Cap Bearing (34) over the output shaft, and using a piece of tubing


that contacts the outer ring of the Bearing, press the Bearing into the Gear Case against the Bearing Stop.

8. **For Series QP05, QP09, QP15, QP20 and QP38**, insert the Planet Gear Head Spacer (28) and Planet Gear Head Assembly (25), spline hub leading, into the open end of the Gear Case.
9. **For Series QP05, QP09, QP15 and QP20**, apply **Ingersoll Rand** No. the three Planet Gears (26) and install them on the shafts of the Planet Gear Head Assembly.
10. **For Series QP15 and QP20**, apply **Ingersoll Rand** No. 67 Grease to the Gear Head Pinion (27) and while meshing the gear teeth, insert it in the opening between the three Planet Gears.
11. **For Series QP38**, install the Planet Gear Head Drive Plate (24) on the shafts of the Planet Gear Head Assembly.
12. **For Series QP05, QP09, QP15 and QP20**, place the Gear Head Spacer (23) in the Gear Case and secure the assembly by using snap ring pliers to install the Gear Retainer (22) in the annular groove inside the Gear Case.

Assembly of the Tool

1. Grasp the hex of the Inlet Bushing Assembly (4) in vise jaws with the Throttle Valve (8A) upward. Pull the stem of the Valve fully outward to enable proper engagement with the trigger stem.
2. Hold the Motor Housing (1) above the Bushing and align the two cut out slots in the inlet end of the Motor Housing with the tabs on the Inlet Bushing Retainer (7).
3. Lower the Housing onto the Bushing until the bottom of the Housing contacts the retainer tabs. If necessary, squeeze the Retainer to start the tabs into the Housing. Push down on the Housing until the tabs engage the two slots in the Housing. Visually inspect the Housing to make certain that both tabs entered the slots in the Housing.
4. Remove the Housing from the vise jaws.
5. Grasp the spline of the Rotor (15) and align the assembled motor so that the End Plate Alignment Dowel (18) is positioned at twelve o'clock in the Housing. It must be aligned with the notch through the threads in the Motor Housing. Insert the assembled motor in the Housing. When the motor is seated properly, the groove below the housing threads for the Motor Seal (20) will be clearly visible.
6. Moisten the Motor Seal with o-ring Lubricant and carefully work it into the Housing against the Front End Plate (17). Use a hex wrench, ball point pen or other non-damaging tool to make certain it is completely seated under the housing threads against the End Plate.
7. Align the tab on the Motor Clamp Washer (21) with the notch in the Housing and the hole in the Washer with the Alignment Dowel in the End Plate and insert the Washer into the Housing. Make certain the Dowel enters the hole in the Washer and the Washer is flat against the Motor Seal. Failure to have the Washer flat, will cause the motor to lock up.
8. While engaging the spline of the rotor shaft with the gearing in the assembled Gear Case (30), thread the two assemblies together hand tight.
9. To tighten the Gear Case on the Housing, proceed as follows:
 - a. Install a standard 1-1/16" open end wrench on the flats of the Gear Case.
 - b. Grasp the handle portion of the Motor Housing and rotate the Housing clockwise to tighten it on the Gear Case.
 - c. Tighten the joint between 15 and 20 ft-lbs. (20.3 and 27.1 Nm) torque.
10. Remove the tool from the vise jaws and thread the Chuck (35) onto the Spindle (29).
11. Check the free speed of the tool using a tachometer and follow the instructions in the **SPEED ADJUSTMENT** section of this manual.

Troubleshooting Guide

Trouble	Probable Cause	Solution
Loss of Power	Low air pressure	Check air supply. For top performance, the air pressure must be 90 psig (6.2 bar/620 kPa) at the inlet.
	Plugged Inlet Bushing Screen	Clean the Inlet Bushing Screen using a clean, suitable cleaning solution. If the Screen cannot be cleaned, replace it.
	Worn or broken Vanes	Replace a complete set of Vanes.
	Worn or broken Cylinder	Replace the Cylinder if it is cracked or if the bore appears wavy or scored.
	Exhaust control restricted	Make certain the exhaust control plate in the Housing is in the fully open position.
Motor won't run	Motor Clamp Washer binding	Remove the Gear Case make certain the Washer is flat and the Motor Seal is properly positioned.
	Gears binding	Clean and inspect all gearing. Replace any worn or damaged gearing.
Leaky Throttle Valve	Worn Throttle Valve and/or Throttle Valve Seat	Install a new Inlet Parts Kit (Part No. TRD-K303).
	Dirt accumulation on Throttle Valve and/or Throttle Valve Seat	Remove the throttle unit from the Housing and disassemble, clean and reassemble the unit as instructed in the maintenance instructions. <div style="text-align: center;">  CAUTION </div> Never flush the throttle unit with leaning solution while it is in the Housing. Internal components will be damaged.
Gear Case gets hot	Excessive grease	Clean and inspect Gear Case and gearing parts and lubricate as instructed.
	Worn or damaged parts	Clean and inspect the gear Case and Gearing. Replace worn or broken components.

Related Documentation

For additional information refer to:

Product Safety Information Manual 04580353.

Product Information Manual 16572034.

Parts Information Manual 16572745.

Manuals can be downloaded from ingersollrandproducts.com

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