

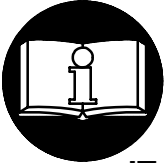


# OPERATION AND MAINTENANCE MANUAL FOR HAS90RB95ML–EU WIRE BRUSH MACHINE

## NOTICE

Model HAS90RB95ML–EU Wire Brush Machines are designed for metal surface preparation in close–quarter work areas.

Ingersoll–Rand is not responsible for customer modification of tools for applications on which Ingersoll–Rand was not consulted.



## ⚠ WARNING

**IMPORTANT SAFETY INFORMATION ENCLOSED.  
READ THIS MANUAL BEFORE OPERATING TOOL.**

**IT IS THE RESPONSIBILITY OF THE EMPLOYER TO PLACE THE INFORMATION  
IN THIS MANUAL INTO THE HANDS OF THE OPERATOR.**

**FAILURE TO OBSERVE THE FOLLOWING WARNINGS COULD RESULT IN INJURY.**

### PLACING TOOL IN SERVICE

- Always operate, inspect and maintain this tool in accordance with all regulations (local, state, federal and country), that may apply to hand held/hand operated pneumatic tools.
- For safety, top performance, and maximum durability of parts, operate this tool at 90 psig (6.2 bar/620 kPa) maximum air pressure at the inlet with 3/8" (10 mm) inside diameter air supply hose.
- Always turn off the air supply and disconnect the air supply hose before installing, removing or adjusting any accessory on this tool, or before performing any maintenance on this tool.
- Do not use damaged, frayed or deteriorated air hoses and fittings.
- Be sure all hoses and fittings are the correct size and are tightly secured. See Dwg. TPD905–1 for a typical piping arrangement.
- Always use clean, dry air at 90 (6.2 bar/620 kPa) psig maximum air pressure. Dust, corrosive fumes and/or excessive moisture can ruin the motor of an air tool.
- Do not lubricate tools with flammable or volatile liquids such as kerosene, diesel or jet fuel.
- Do not remove any labels. Replace any damaged label.

### USING THE TOOL

- Always wear eye protection when operating or performing maintenance on this tool.
- Always wear hearing protection when operating this tool.
- Keep hands, loose clothing and long hair away from rotating end of tool.
- Anticipate and be alert for sudden changes in motion during start up and operation of any power tool.
- Keep body stance balanced and firm. Do not overreach when operating this tool. High reaction torques can occur at or below the recommended air pressure.
- Tool accessories may continue to rotate briefly after throttle is released.
- Air powered tools can vibrate in use. Vibration, repetitive motions or uncomfortable positions may be harmful to your hands and arms. Stop using any tool if discomfort, tingling feeling or pain occurs. Seek medical advice before resuming use.
- Use accessories recommended by Ingersoll–Rand.
- This tool is not designed for working in explosive atmospheres.
- This tool is not insulated against electric shock.

## NOTICE

The use of other than genuine Ingersoll–Rand replacement parts may result in safety hazards, decreased tool performance, and increased maintenance, and may invalidate all warranties.

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

Refer All Communications to the Nearest  
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**INGERSOLL–RAND®**  
**PROFESSIONAL TOOLS**


## WARNING LABEL IDENTIFICATION

### ⚠ WARNING


FAILURE TO OBSERVE THE FOLLOWING WARNINGS COULD RESULT IN INJURY.


|   |   |
|---|---|
|  | <b>⚠ WARNING</b>  |
|   | Always wear eye protection when operating or performing maintenance on this tool. |


|   |  |
|---|--|
|  | <b>⚠ WARNING</b>   |
|   | Always wear hearing protection when operating this tool. |


|   |   |
|---|---|
|  | <b>⚠ WARNING</b>  |
|   | Always turn off the air supply and disconnect the air supply hose before installing, removing or adjusting any accessory on this tool, or before performing any maintenance on this tool. |



|   |  |
|---|--|
|  | <b>⚠ WARNING</b>   |
|   | Air powered tools can vibrate in use. Vibration, repetitive motions or uncomfortable positions may be harmful to your hands and arms. Stop using any tool if discomfort, tingling feeling or pain occurs. Seek medical advice before resuming use. |

|   |                                    |
|---|------------------------------------|
|  | <b>⚠ WARNING</b>                   |
|   | Do not carry the tool by the hose. |

|   |  |
|---|--|
|  | <b>⚠ WARNING</b>   |
|   | Do not use damaged, frayed or deteriorated air hoses and fittings. |

|   |  |
|---|--|
|  | <b>⚠ WARNING</b>   |
|   | Keep body stance balanced and firm. Do not overreach when operating this tool. |

|   |   |
|---|---|
|  | <b>⚠ WARNING</b>  |
|   | Operate at 90 psig (6.2 bar/ 620 kPa) Maximum air pressure. |

|   |   |
|---|---|
| <b>International Warning Label:<br/>Order Part No. _____</b>                        |   |
|  |  |

## SPECIFIC WARNINGS

### ⚠ WARNING

FAILURE TO OBSERVE THE FOLLOWING WARNINGS COULD RESULT IN INJURY.

- This Wire Brush Machine will operate at the free speed specified on the nameplate if the air supply line furnishes 90 psig (6.2 bar/620 kPa) air pressure at the tool. Operation at higher air pressure will result in excessive speed.
- Use only a wire brush with this tool. Do not use any grinding wheel, bur or metal removing accessory other than a wire brush with this tool. Never use an accessory having a maximum operating speed less than the free speed of the Wire Brush Machine in which it is being used.
- When using a wire brush on the threaded arbor, make certain the flange nut is tightened securely. Check the tightness of the flange nut before operating this tool to make certain it will not loosen during operation.

# PLACING TOOL IN SERVICE

## LUBRICATION



Ingersoll-Rand No. 10    Ingersoll-Rand No. 67  
 Ingersoll-Rand No. 50    Ingersoll-Rand No. 68  
 Ingersoll-Rand No. 63    Ingersoll-Rand No. 77

Always use an air line lubricator with these tools.  
 We recommend the following Filter-Lubricator-Regulator Unit:

For USA – No. C26-C4-A29

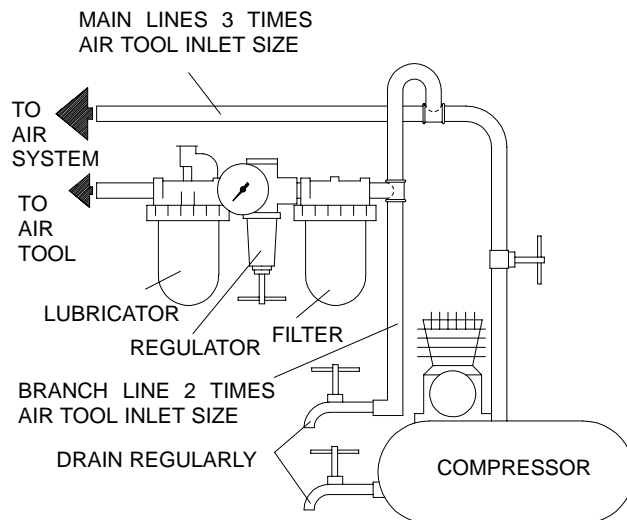
**After each 2 hours of operation**, if an air line lubricator is not used, inject 1/2 to 1 cc of Ingersoll-Rand No. 10 Oil into the air inlet.

**After each eight hours of operation**, inject approximately 3 cc of Ingersoll-Rand No. 67 or Ingersoll-Rand No. 77 into the Angle Head Grease Fitting (31).

**Excessive lubrication will cause grease to work out around the Arbor.**

## CAUTION

Do not mark any nonmetallic surface on this tool with customer identification codes. Such actions could affect tool performance.



(Dwg. TPD905-1)

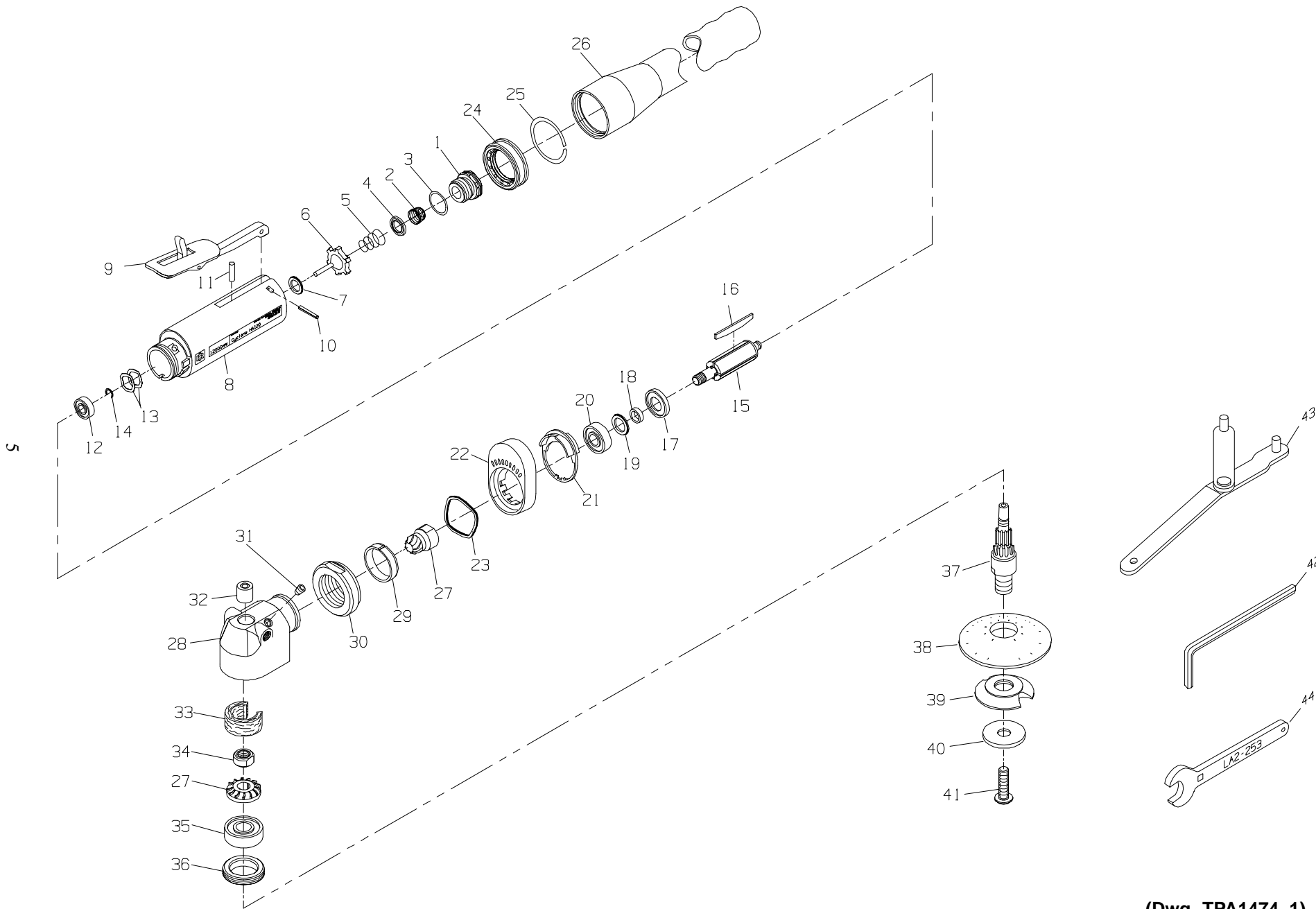
## SPECIFICATIONS

### ANGLE WIRE BRUSH MACHINE with M14 x 2.0-6g SPINDLE THREAD

| Model                         | Speed<br>rpm | Sound Level<br>dB (A) |       | Vibrations<br>Level |
|-------------------------------|--------------|-----------------------|-------|---------------------|
|                               |              | Pressure              | Power | m/s <sup>2</sup>    |
| HAS90RB95ML-EU (Rear Exhaust) | 9,000        | 85.1                  | 98.1  | 1.6                 |

- Tested in accordance with ANSI S5.1-1971 at free speed
- ◆ Tested in accordance with ISO8662-1 sanding on steel workpiece
- ISO3744





(Dwg. TPA1474-1)



PART NUMBER FOR ORDERING →

PART NUMBER FOR ORDERING →

|      |   |            |      |   |               |
|------|---|------------|------|---|---------------|
| 1    | Inlet Assembly . . . . .                  | LG2-A465   | 25   | Exhaust Hose Retainer . . . . .                                       | 6WT-203       |
| 2    | Inlet Screen . . . . .                    | R1602-61   | 26   | Exhaust Hose . . . . .  | 3RL-284       |
| • 3  | Inlet Seal . . . . .                      | R18LF-21   | *    | Warning Label . . . . .   | EU-99         |
| 4    | Throttle Valve Spring Seat . . . . .      | LG3-592    | *    | Nameplate . . . . .   | LAS309-EU-301 |
| 5    | Throttle Valve Spring . . . . .           | 7L-51      | 27   | Bevel Pinion and Bevel Gear<br>(sold only as a matched set) . . . . . | LA2-A552-1.9  |
| 6    | Throttle Valve . . . . .                  | LG3-302    | + 28 | Angle Housing Assembly . . . . .                                      | LA2-A550S     |
| 7    | Throttle Valve Seat . . . . .             | LG3-303    | 29   | Clamp Spacer . . . . .  | LA2-46        |
| 8    | Motor Housing . . . . .                   | LG3-40     | 30   | Clamp Nut . . . . .   | LG2-27        |
| 9    | Locking Throttle Lever Assembly . . . . . | LG2-A400   | 31   | Grease Fitting . . . . .  | D0F9-879      |
| *    | Lever Lock . . . . .                      | LG1-402    | 32   | Upper Arbor Bearing . . . . .   | AG210-693     |
| *    | Lock Spring . . . . .                     | LG1-405    | 33   | Wick . . . . .  | LA2-560       |
| *    | Lock Pin . . . . .                        | 5UT-757    | 34   | Bevel Gear Nut . . . . .  | LA2-578       |
| 10   | Throttle Lever Pin . . . . .              | 61H-120    | 35   | Lower Arbor Bearing . . . . .   | LA2-593       |
| 11   | Throttle Valve Plunger . . . . .          | LG2-191    | 36   | Arbor Bearing Cap . . . . .   | AG20-531      |
| 12   | Rear Rotor Bearing . . . . .              | R120-127   | 37   | Arbor . . . . .   | AG230-4-945   |
| • 13 | Rear Rotor Bearing Spacer (2) . . . . .   | 400-25-191 | 38   | Wheel Flange . . . . .  | LG3-337-45M   |
| 14   | Rear Rotor Bearing Retainer . . . . .     | LG1-118    | 39   | Flange Nut . . . . .  | AG230-338-45M |
| 15   | Rotor . . . . .                           | LG3-53-4   | 40   | Wheel Retaining Screw Washer . . . . .                                | LG2-218       |
| • 16 | Vane Packet (set of 4 Vanes) . . . . .    | DG31-42-4  | 41   | Wheel Retaining Screw . . . . .                                       | LG2-219M      |
| 17   | Front End Plate . . . . .                 | LG2-11     | 42   | Arbor Wrench (6 mm hex wrench) . . . . .                              | AG230-340M    |
| 18   | Front End Plate Spacer . . . . .          | LG2-65     | 43   | Flange Nut Wrench (adjustable spanner) . . . . .                      | AG230-26M     |
| • 19 | Front Seal Cup Assembly . . . . .         | 61H-A32    | 44   | Clamp Nut Wrench (1-1/2") . . . . .                                   | LA2-253       |
| 20   | Front Rotor Bearing . . . . .             | LG2-24     | *    | I-R No. 10 Oil (4 oz. bottle) . . . . .                               | 10Z4          |
| 21   | Flow Ring (blue) . . . . .                | LG3-103-3  | *    | I-R No. 63 Oil (4 oz. bottle) . . . . .                               | 63Z4          |
| 22   | High Profile Flange . . . . .             | LG2-23     | *    | I-R No. 67 Grease (1 lb. can) . . . . .                               | 67-1LB        |
| 23   | Flange Clamp . . . . .                    | LG2-29     | *    | I-R No. 77 Grease (1 lb. can) . . . . .                               | 77-1LB        |
| 24   | Exhaust Hose Adapter . . . . .            | LG2-184    |      |   |               |

\* Not illustrated.

• To keep downtime to a minimum, it is desirable to have on hand certain repair parts. We recommend that you stock one (pair or set) of each part indicated by a bullet (•) for every four tools in service.

+ The LA2-A550S Angle Housing Assembly is furnished with three Wicks. Use Wick (LA2-560) **without** the notch.

## MAINTENANCE SECTION

### WARNING

Always wear eye protection when operating or performing maintenance on this tool.

Always turn off the air supply and disconnect the air supply hose before installing, removing or adjusting any accessory on this tool, or before performing any maintenance on this tool.

### LUBRICATION

Whenever one of these Wire Brush Machines is disassembled for overhaul or replacement of parts, lubricate as follows:

1. Always wipe the Vanes (16) with a light film of oil before inserting them into the vane slots.
2. Inject 0.5 to 1.0 cc of Ingersoll–Rand No. 10 Oil into the air Inlet Assembly (1) after assembly.

### DISASSEMBLY

#### General Instructions

1. Do not disassemble the tool any further than necessary to replace or repair damaged parts.
2. When grasping a tool or part in a vise, always use leather–covered or copper–covered vise jaws to protect the surface of the part or tool 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 new gaskets and O–rings for replacement.
5. Do not press any needle bearing from a part unless you have a new needle bearing on hand for installation. Needle bearings are always damaged during the removal process.

#### Disassembly of the Angle Head

1. Grasp the tool in copper–covered or leather–covered vise jaws with the Flange Nut (39) upward.
2. Using a 4 mm hex wrench, unscrew and remove the Wheel Retaining Screw (41) and Wheel Retaining Screw Washer (40).
3. Use the Arbor Wrench (42) to hold the Arbor (37) and using the Flange Nut Wrench (43), **unscrew and remove the Flange Nut. Remove the wire brush and Wheel Flange (38) from the Arbor.**
4. Using a spanner wrench, unscrew and remove the Arbor Bearing Cap (36). This is a **left–hand thread**. Rotate the spanner wrench **clockwise** to remove the Cap.

### NOTICE

**In the following step, do not allow the Angle Head to rotate when separating it from the Motor or Extension Housing. Components may fall from the Extension Housing or Motor Housing.**

5. Using the Clamp Nut Wrench (44), loosen the Clamp Nut (30) and pull the Angle Housing Assembly (28) away from the Motor Housing (8). This is a **left–hand thread**. Rotate the Nut Wrench **clockwise** to loosen the Nut.
6. Remove the Flange Clamp (23) from the Angle Housing or Flange (22).
7. Grasp the Arbor and pull the assembled Arbor out of the Angle Head. If the Wick (33) needs replacement, pull it out of the Angle Housing. The Wick is staked into position and will be destroyed by removal. Make certain a replacement Wick is available before removing the old Wick.
8. If the Upper Arbor Bearing (32) needs replacement, place the Angle Head on the table of an arbor press, arbor end down, and press the Bearing out of the Angle Head.
9. Grasp the Arbor in copper–covered or leather–covered vise jaws with the wheel end downward. Using an adjustable wrench, unscrew and remove the Bevel Gear Nut (34) and lift the Bevel Gear off the Arbor.
10. If the Lower Arbor Bearing (35) must be replaced, use a piece of tubing to support the Bearing on the table of an arbor press and press the Arbor from the Bearing.

#### Disassembly of the Motor

1. Pull the Flange (22) and Flow Ring (21) off the front of the Motor Housing (8).
2. Grasp the Bevel Pinion (27) and pull the assembled motor out of the Motor Housing. Remove the two Rear Rotor Bearing Spacers (13) from the bottom of the Housing.
3. Remove the Vanes (16) from the Rotor (15).
4. Grasp the Rotor in copper–covered or leather–covered vise jaws with the Bevel Pinion upward. Using a 9/16” wrench, unscrew and remove the Pinion.
5. If the Front Rotor Bearing (20) must be replaced, support the Front End Plate (17) between two blocks on the table of an arbor press. Place the blocks as close to the body of the Rotor as possible and press the Rotor from the Bearing and End Plate. Remove the Front End Plate Spacer (18) and Front Seal Cup Assembly (19) from the hub of the Rotor.
6. If the Rear Rotor Bearing (12) must be replaced, use snap ring pliers to remove the Rear Rotor Bearing Retainer (14).

## MAINTENANCE SECTION

7. Using a bearing puller, pull the Rear Rotor Bearing off the hub of the Rotor.

### Disassembly of the Inlet and Throttle

1. Using a 15/16" wrench or six point socket, unscrew and remove the Inlet Assembly (1).
2. Remove the Inlet Seal (3) and Inlet Screen (2) from the Inlet.
3. Remove the Throttle Valve Spring Seat (4), Throttle Valve Spring (5) and Throttle Valve (6) from the Motor Housing (8).
4. If the Throttle Valve Seat (7) must be replaced, insert a hooked tool through the central opening of the Seat and, catching the underside of the Seat, pull it from the Housing.
5. Press the Throttle Lever Pin (10) from the Housing and remove the Throttle Lever (9). Remove the Throttle Valve Plunger (11).

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## ASSEMBLY

---

### General Instructions

1. Always press on the **inner** ring of a ball-type bearing when installing the bearing on a shaft.
2. Always press on the **outer** ring of a ball-type bearing when pressing the bearing into a bearing recess.
3. Whenever grasping a tool or part in a vise, always use leather-covered or copper-covered vise jaws. Take extra care not to damage threads or distort housings.
4. Except for bearings, always clean every part and wipe every part with a thin film of oil before installation.
5. Check every bearing for roughness. If an open bearing must be cleaned, wash it thoroughly in clean solution and dry with a clean cloth. Sealed or shielded bearings should not be cleaned. Work grease into every open bearing before installation.
6. Apply a film of o-ring lubricant to every O-ring before installation.
7. Unless otherwise noted, always press on the stamped end of a needle bearing when installing a needle bearing into a recess.

### Assembly of the Throttle and Inlet

1. Insert the Throttle Valve Plunger (11) into the Motor Housing (8).
2. Position the Throttle Lever (9) on the Motor Housing and using an arbor press, press the Throttle Lever Pin (10) into the Housing and Lever. The Lever will retain the Plunger in the Housing.
3. If the Throttle Valve Seat (7) was removed, use a 5/8" wooden dowel with a flat end to push the Seat into the Motor Housing.
4. Push the small end of the Throttle Valve Spring (5) onto the end of the Throttle Valve (6) with the short stem until the Spring snaps into position around the hub and remains there. Install the dish end of the Throttle Valve Spring Seat (4) onto the large end of the Throttle Valve Spring.

5. Holding the Housing with the Lever downward, make sure the Plunger is out of the way and insert the assembled Throttle Valve, long stem end leading, into the housing recess.
6. Push the Inlet Screen (2), closed end leading, into the bushing of the Inlet Assembly (1). After moistening the Inlet Seal (3) with o-ring lubricant and being careful not to nick the Seal on the threads of the Inlet, install the Seal on the Inlet.
7. Thread the Inlet Assembly into the Housing and tighten it between 20 to 25 ft-lb (27.1 to 33.9 Nm) torque.

### Assembly of the Motor

1. If the Rear Rotor Bearing (12) was removed, stand the Rotor (15) upright on the table of an arbor press with the threaded end downward. Place the threaded rotor hub into a hole drilled into a flat, smooth block so that the Rotor rests against the large rotor body. Press the Rear Rotor Bearing onto the hub of the Rotor.
2. Install the Rear Rotor Bearing Retainer (14) in the groove on the hub of the Rotor.
3. Install the Front End Plate (17), counterbored end trailing, onto the threaded hub of the Rotor. Using finger pressure, press the Front Seal Cup Assembly (19), felt end trailing, onto the end of the Front End Plate Spacer (18) that is opposite the the large internal bevel. Continue pressing until the felt end is flush with the end of the Spacer. Saturate the felt with Ingersoll-Rand No. 50 Oil. Place the assembled Spacer, Seal Assembly trailing, onto the threaded hub of the Rotor. Make sure the Seal Assembly enters the recess in the Front End Plate.

### NOTICE

**Before performing the next step, be aware that the Front Rotor Bearing is a flush ground bearing and must be installed in a specific manner. The end of the Bearing with a black stain or hash marks must be away from the Spacer.**

4. Stand the small hub of the Rotor on the table of an arbor press with the threaded end upward and press the Front Rotor Bearing (20) onto the hub of the Rotor.
5. Grasp the assembled Rotor in copper-covered or leather-covered vise jaws with the threaded rotor hub upward.
6. Thread the Bevel Pinion (27) onto the Rotor and using a torque wrench, tighten the Pinion between 14 and 19 ft-lb (19.0 and 25.8 Nm) torque.
7. Inject approximately 1/2 cc of Ingersoll-Rand No. 68 Grease into the small recess at the bottom of the motor housing bore. Drop the two Rear Rotor Bearing Spacers (13) into the bottom of the motor housing bore.



## MAINTENANCE SECTION

8. Wipe each Vane (16) with a light film of oil and insert a Vane into each vane slot in the Rotor.
9. Grasp the Bevel Pinion and insert the assembled Rotor into the Motor Housing (8).
10. Assemble the Flow Ring (21) with the Flange (22) before installing the Flange on the Housing. Mate the Flow Ring to the end of the Flange without perforations. The positioning of the Flow Ring is dictated by the desired exhaust. To set the tool exhaust, align the notched projection on the edge of the Flow Ring with the letter "R" on the Housing.
11. Carefully install the assembled Flange, Flow Ring leading, onto the front of the Motor Housing. Make certain the Ring properly engages the Housing.

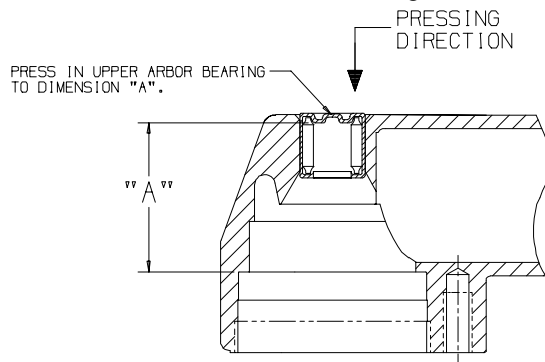
### Assembly of the Angle Head

1. If the Upper Arbor Bearing (32) was removed and a new Bearing must be installed, proceed as follows:
  - a. Support the machined face of the Angle Head (28) on the table of an arbor press with the upper arbor bearing bore upward.

#### NOTICE

**When installing the Bearing in the next step, always press on the stamped or closed end of the Bearing.**

- b. Press a new Upper Arbor Bearing into the bore, to dimension "A" shown in drawing TPD1889.



PRESSING DIMENSIONS

| DIM. | MAXIMUM |       | MINIMUM |       |
|------|---------|-------|---------|-------|
|      | IN.     | MM    | IN.     | MM    |
| A    | 1.002   | 25.45 | .0997   | 25.32 |

LA2-A550S UPPER ARBOR BEARING PRESSING DIMENSION

**(Dwg. TPD1889)**

2. If the Lower Arbor Bearing (35) is being installed, it is necessary to note the identification marks on the Lower Arbor Bearing. One side of the Bearing has black stains or black hash marks across the inner and outer races. Using a sleeve that contacts the inner ring of the Lower Arbor Bearing, press the Bearing, black stain or hash mark side leading, onto the Arbor (37).

\* Product of National Starch and Chemical Corporation.

#### NOTICE

**The Bevel Gear and Bevel Pinion in the next step are specially matched sets. Some sets are color coded for manufacturing purposes only. Only the Gear and Pinion set furnished as a replacement part or the same Gear and Pinion set removed from one tool, is a matched set. A Bevel Gear from one tool used with a Bevel Pinion from another tool with the same color code IS NOT A MATCHED SET. Replace these parts only as a matched set. Failure to do so will result in unsatisfactory tool performance and damage to the Bevel Gear and Bevel Pinion.**

3. Slide the Bevel Gear (27), geared face trailing, onto the small threaded end of the Arbor, aligning the integral keys or spline of the Gear with the slotted keyways or spline in the Arbor.
4. Thoroughly clean the small threads on the Arbor above the Bevel Gear and the threads in the Bevel Gear Nut (34).
5. Apply a thin coat of Permalock\* HM118 to the threads of the Bevel Gear Nut. Thread the Bevel Gear Nut onto the Arbor to retain the Bevel Gear and tighten the Nut between 8 and 9 ft-lb (10.8 and 12.2 Nm) torque.
6. Form the Wick (33) into a horseshoe shape and fully insert it into the U-shaped cavity in the Angle Head. Make certain the Wick is positioned behind the staking points in the Angle Head. Saturate the Wick with approximately 1.5 cc of Ingersoll-Rand No. 63 Oil. Do not substitute any other oil.
7. Inject 3 cc of Ingersoll-Rand No. 67 or Ingersoll-Rand No. 77 Grease into the Upper Arbor Bearing and Wick cavity in the Angle Head. Do not substitute any other grease.
8. Carefully grasp the assembled motor in copper-covered or leather-covered vise jaws with the Throttle Lever downward.
9. Install the motor Clamp Nut (30), threaded end trailing, onto the motor end of the Angle Head. Spread the Clamp Spacer (29) and install it, beveled end trailing, onto the motor end of the Angle Head against the Clamp Nut.
10. Position the output end of the Angle Head upward and 180 degrees opposite to the Throttle Lever and thread the Clamp Nut onto the Motor Housing. Using the Motor Clamp Nut Wrench (44), tighten the Nut between 20 and 25 ft-lb (27 and 34 Nm) torque. This is a **left-hand thread**, turn **counterclockwise** to tighten.
11. Thoroughly clean the internal threads of the Angle Head and the threads on the Arbor Bearing Cap (36).

## **MAINTENANCE SECTION**

12. Insert the assembled Arbor into the Angle Head, bevel gear end first, making sure the teeth on the Bevel Gear and Pinion mesh. Rotate the Arbor manually to determine they are rotating smoothly.
13. Carefully apply a uniform coat of Vibra-Tite VC3 No.205 \*\* to at least the first three threads of the Arbor Bearing Cap and allow the compound to cure for 12 to 15 minutes.
14. Using a spanner wrench, install the Arbor Bearing Cap and tighten it between 12 and 15 ft-lb (16.2 and 20.3 Nm) torque. The Bearing Cap has a **left-hand thread**: turn **counterclockwise** to install.

### **Assembly Instructions for All Wheel Models**

1. Install the Wheel Flange (38), wire brush and Flange Nut (39) on the Arbor. Use the Arbor Wrench (42) to hold Arbor while tightening the Flange Nut with the Flange Nut Wrench (43).
2. Install the Wheel Retaining Screw Washer (40) and Wheel Retaining Screw (41) and tighten the Screw securely.

\*\* Product of N.D. Industries.

## MAINTENANCE SECTION

### TROUBLESHOOTING GUIDE

| Trouble  | Probable Cause  | Solution   |
|--|---|--|
| Low power or low free speed  | Insufficient air pressure   | Check air line pressure at the Inlet of the Tool. It must be 90 psig (6.2 bar/620 kPa).  |
|  | Clogged muffler elements  | Disassemble the Tool and agitate bare Motor Housing and Flange in clean suitable cleaning solution. If elements cannot be cleaned, replace the Motor Housing and/or the Flange.  |
|  | Plugged Inlet Screen  | Clean the Inlet Screen in clean suitable cleaning solution or replace the Screen.  |
|  | Worn or broken Vanes  | Install a <b>complete</b> set of new Vanes.  |
|  | Loose Clamp Nut   | Tighten the Nut between 20 and 25 ft-lb (27 and 34 Nm) torque.   |
|  | Worn or broken Motor Housing  | Replace the Motor Housing.   |
|  | Internal air leakage in the Motor Housing indicated by high air consumption/low speed or air leaking out the front and rear exhaust simultaneously. | Replace the Motor Housing.   |
|  | Grit buildup under the Throttle-Lever restricting full Throttle-Valve Plunger movement.   | Remove the Throttle Lever and clean the groove in the Motor Housing.   |
|  | Bent stem on Throttle Valve   | Replace the Throttle Valve.  |
| Front Seal Cup Assembly dragging against the shield of the Front Rotor Bearing | Reposition the Front Seal Cup Assembly.   |  |
| Excessive runout   | Bent Arbor  | Replace the Arbor.   |
|  | Worn or damaged Upper Arbor Bearing or Lower Arbor Bearing  | Replace the worn or damaged Bearing.   |
| Scoring of End Plate   | Worn Front End Plate Spacer or Front End Plate  | Install a new Front End Plate Spacer and Front End Plate.  |
|  | Worn Front Rotor Bearing  | Install a new Front Rotor Bearing.   |
| Leaky Throttle Valve   | Dirt accumulation on Throttle Valve or Throttle Valve Seat  | Disassemble, inspect and clean parts.  |
|  | Worn Throttle Valve or Throttle Valve Seat  | Replace the Throttle Valve and/or Throttle Valve Seat.   |
|  | Excessive dirt build-up beneath the Throttle Lever  | Clean out the slot area.   |
|  | Bent Throttle Valve Plunger   | Replace the Plunger.   |
| Exhausts at wrong direction  | Incorrect orientation of the Flow Ring  | Reverse the face of the Flow Ring against the Motor Housing.   |
| Front Rotor Bearing runs hot   | Incorrect installation of the Front Seal Cup Assembly   | Reposition the Front Seal Cup Assembly flush with the face of the Front End Plate Spacer.  |
|  | Front End Plate Spacer rubbing the bore of the Front End Plate  | Replace the Front End Plate and Front End Plate Spacer combination.  |
|  | Incorrect Front Rotor Bearing installation orientation  | If a black stain or black hashmarks are not visible on the face of the Bearing when it is assembled with the End Plate and Rotor, the Bearing is installed backwards. If possible, remove the Bearing and install it correctly or replace the Bearing. |

## MAINTENANCE SECTION

### TROUBLESHOOTING GUIDE (Continued)

| <b>Trouble</b>               | <b>Probable Cause</b>                                     | <b>Solution</b>   |
|------------------------------|---|---|
| Slow tool idle               | Bent or leaky Throttle Valve                              | Replace the Throttle Valve.   |
| Air leakage around Flow Ring | Damaged, mutilated or missing Flange Clamp                | Replace the Flange Clamp.   |
|                              | Damaged Flow Ring   | Replace the Flow Ring.  |
| Rough operation/vibration    | Improper lubrication or dirt buildup                      | Disassemble the tool and clean in a clean, suitable cleaning solution. Assemble the tool and inject 3 cc of the recommended oil into the Inlet and run the tool long enough to coat the internal parts with the oil.                |
|                              | Worn or broken Rear Rotor Bearing or Front Rotor Bearing  | Replace the worn or broken Bearings. Examine the Front End Plate, Front End Plate Spacer Front Seal Cup Assembly and Rear Rotor Bearing Spacers and replace any damaged parts. If the rear end plate is damaged, replace the Rotor. |
|                              | Worn or broken Upper Arbor Bearing or Lower Arbor Bearing | Replace the worn or broken Bearing.   |
|                              | Worn or broken Bevel Gear or Bevel Pinion                 | Examine the Bevel Gear and Bevel Pinion. If either is worn or damaged, replace both the Gear and the Pinion because they are a matched set and must not be used separately.   |

#### NOTICE

**SAVE THESE INSTRUCTIONS. DO NOT DESTROY.**