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## SERVICE MANUAL FOR CIRCLE DYNAMICS INC.

### **DOYLE 619-4 AIR MOTOR**

(Replaces DSO 59600 Nov 1, 2019)

#### **WARNING**

This product is intended for use in industrial applications only. It is the user's responsibility to ensure that the maximum recommended pressures and speeds are not exceeded during use. It is also the user's responsibility to ensure that all forms of external energy are removed from the product prior to servicing to eliminate the risk of being injured by pressurized or rotating components during servicing. Due to the high efficiency of these motors, excess moisture in the air will cause icing in the exhaust port.

#### **FAILURE MODES**

This product is only intended to be used in accordance with Circle Dynamics instructions for use and applications. Any other application or use in excess of recommended pressures or speed may result in serious injury. Restricting exhaust may cause failure.

#### **INSTALLATION (Refer to Figure 1)**

1. Connect Air Motor to drive unit or shaft best suited to your application.
2. Connect unit to tank, barrel or tote to be mixed.
3. Connect metered, regulated supply air to appropriate port for desired rotation. Only clean, dry, filtered air may be used. Excess moisture in the air may cause icing in the port.
4. Connect exhaust port to exhaust collection header or install a separate exhaust muffler.
5. Turn on supply air at recommended pressure and adjust flow to obtain desired speed. (Optional Doyle tachometer part #60303)



fig. 1

## **REBUILD INSTRUCTIONS FOR DOYLE 619-4 AIR MOTOR**

### **DISASSEMBLY**

1. De-energize air motor from all sources of energy and disconnect from drive unit to prepare for disassembly.
2. Remove Screws (2) from Motor Body Assembly (14) and remove Head Cover (3).
3. Hold Crankshaft (8) with wrench while removing Crank Pin (5) with a 1-1/8 socket.
4. Remove and inspect wave washer (21)
5. Remove the top Thrust Washer (6) from Rod Assembly (12).
6. Remove Needle Bearing (7) from centre.
7. Remove Screws (2) from each of the six Cylinder Caps (15). Remove Cylinder Caps (15) Rod Assembly (12) and Cap Seals (13) as a unit. Discard Cap Seals (13).
8. Remove Rod assembly (12) from the Cylinder Caps (15).
9. Remove Piston Seals (20) from the Rod Assembly (12). Discard Piston Seal.

**STOP HERE if using Piston Seal Kit 619-4A. Proceed to 'Assembly Instructions' #7-17.**

**Continue with Disassembly Instructions #9-16 if using Motor Repair Kit 619-4B.**

10. Remove lower Thrust Washer (6).
11. Remove Snap Ring (19) from Crankshaft (8) and press Crankshaft (8) up through the Motor Body Assembly (14).
12. Remove O-ring (10) from the Motor Body Assembly (14) and discard.
13. Using a bearing puller, remove Bearing (18) from the Motor Body Assembly (14) and discard.
14. Remove Snap Ring (17) and Crank Seal (16). Discard Crank Seal.
15. Remove Snap Ring (11) from Crankshaft (8). Then remove Bearing (9) from Crankshaft (8) and discard.
16. **DO NOT** remove Motor Head from the Motor Body Assembly (14).  
Doing this will void warranty!
17. Clean and dry all components in a clean environment and prepare for re-assembly.

## ASSEMBLY

1. Install O-Ring (10) in the Motor Body Assembly (14).
2. Lubricate the inside of the Motor Body Assembly (14) and the O-Ring (10) with recommended grease.
3. Install new Bearing (9) on Crankshaft (8) and secure with Snap Ring (11).
4. Install new Crank Seal (16) with seal lip facing up in the drive end of the Motor Body Assembly (14) and secure it with the Snap Ring (17).
5. By hand, carefully, so as not to damage the O-Ring (10), install the Crankshaft (8) into place. Press Crankshaft (8) the rest of the way using a 3 ton arbor press.  
**DO NOT** press on the counterweight of the crankshaft, as this may damage it.
6. Press into place Bearing (18), while supporting the top end of the Crankshaft (8) to prevent the Bearing (9) from moving. Install the Snap Ring (19).  
At this point the crank shaft should move freely. Test by turning the bottom of the crank shaft (8) by hand.
7. If applicable, install the new Piston Seal (20) onto the Rod Assembly (12) with seal lip facing the top of the piston. Install O-ring on second piston groove. Lubricate piston with ample recommended grease.  
***(For ease of seal installation: use piston seal installation tool Part# 60269)***
8. Lubricate the inside of the Cylinder Cap (15) and Piston. Insert the Rod Assemblies (12) into the Cylinder Caps (15).
9. Install the lower Thrust Washer (6) onto the top end of the Crankshaft (8) with the flat side down.
10. Install the new Cap Seal (13) into the Cylinder Cap (15).
11. As a unit, install Rod Assembly (12) and Cylinder Cap (15) through the opening in the Motor Body Assembly (14). Hook the end of the Rod Assembly into the bottom of the Thrust Washer (6). Repeat for remaining 5 Rod Assemblies (12).
12. When all six Rod Assemblies (12) and Cylinder Sleeves (15) are in position, lubricate the ends of the Rod Assemblies (12) with recommended grease.
13. Pack the new Needle Bearing (7) with recommended grease and then slide it down through the centre of the Rod Assemblies.
14. Secure all six Cylinder Caps (15) using Screws (2). Tighten Screws (2) to 40 in/lbs of torque.

15. Install the top Thrust Washer (6) with the flat side up.
16. Install Wave Washer (21) onto Crank Pin (5). Slide Crank Pin (5) down through the centre of the assembly. Be sure that the Crank Pin (5) is located into the threaded hole of the Crankshaft (8). Tighten Crank Pin (5) to 18 ft/lbs of torque.
17. Using recommended grease and Grease Fitting (4), pump the Crank Pin (5) full of grease until grease comes out the sides of the Thrust Washers (6).
18. Using a wrench on the drive end of the Crankshaft (8), rotate the Crankshaft (8) to ensure the motor turns freely.
19. If necessary, tap the drive end of the Crankshaft (8) lightly with a soft hammer to centre the bearings. Repeat step #18.
20. Attach the Head Cover (3) with the Screws (2). Tighten to 40 in/lbs of torque.

Connect motor to appropriate air supply, set speed and test for smoothness and leaks.

**Tachometer instructions** (if applicable):

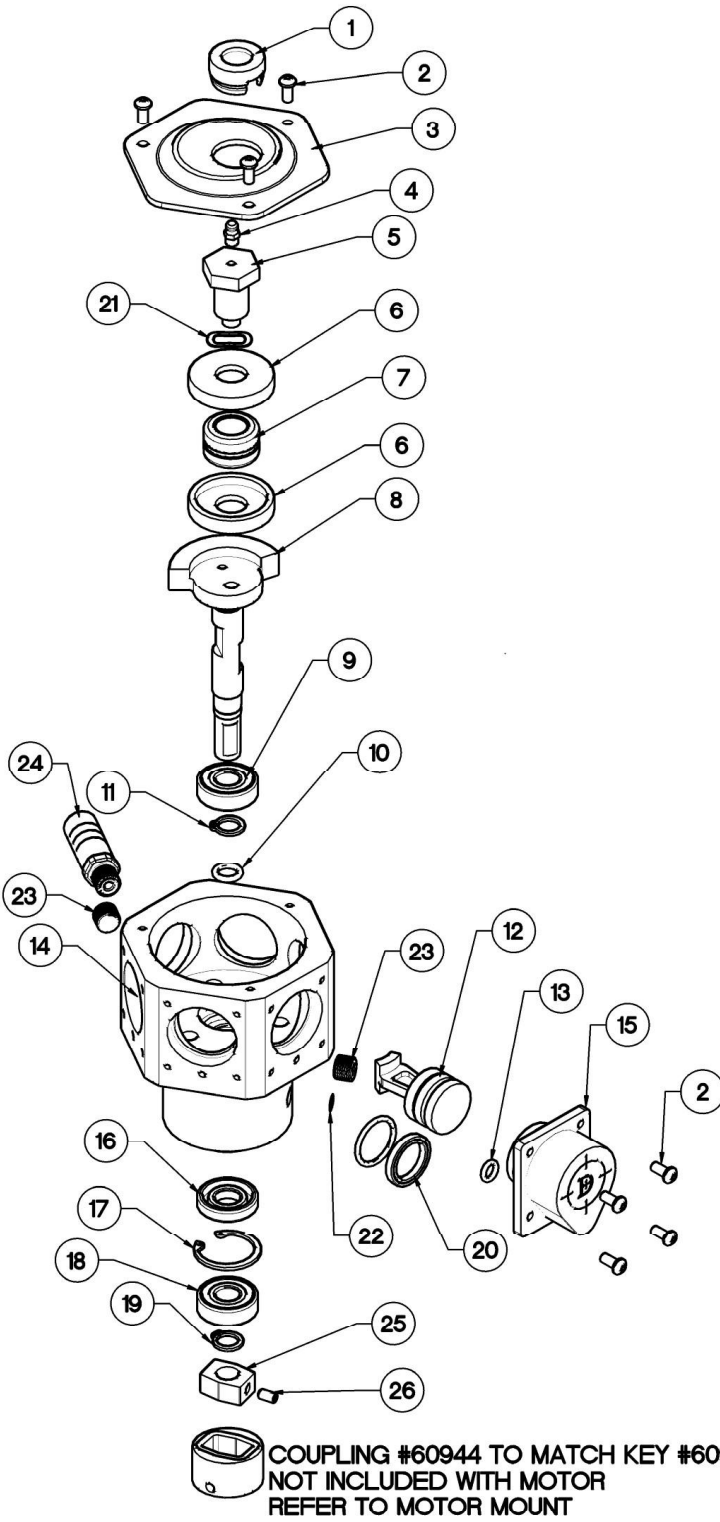
Depress tachometer button to display the current RPM. Release button when RPM has been confirmed.

Please contact your distributor for replacement unit when battery is no longer functioning. Or tachometer fails to display the current RPM.

For more information on the Tachometer or the Doyle Speed Control Unit please contact us at:

[rjones@circledynamicsinc.com](mailto:rjones@circledynamicsinc.com)

# DOYLE 619-4 AIR MOTOR



KEY	PART #	QTY.	DESCRIPTION
1	60101	1	VENT
2	60118	27	SCREW
3	60103-BR	1	HEAD COVER
4	60104	1	GREASE FITTING
5	59111	1	CRANK PIN
6	59106	2	THRUST WASHER
7	60105	1	NEEDLE BEARING
8	59093	1	CRANKSHAFT
9	60106	1	BEARING
10	60107	1	O-RING
11	60592	1	SNAP RING
12	59113	6	ROD ASSEMBLY
13	60605	6	CAP SEAL
14	60604-BR	1	MOTOR BODY ASSEMBLY
15	60545	6	CYLINDER CAP
16	60110	1	CRANK SEAL
17	60111	1	SNAP RING
18	60112	1	BEARING
19	60113	1	SNAP RING
20	60114	6	PISTON SEAL
21	60613	1	WAVE WASHER
22	60361	1	SCREEN
23	60355	2	PLUG
24	60410	1	MUFFLER
25	60943	1	KEY
26	92695	1	SET SCREW

KEY	PART #	QTY.	DESCRIPTION
30	619-4A	1	PISTON SEAL KIT Contains: 6 (20)60114 PISTON SEAL 6 (13)60605 CAP SEAL
31	619-4B	1	MOTOR REPAIR KIT Contains: 6 (20)60114 PISTON SEAL 6 (13)60605 CAP SEAL 6 (21)59113 ROD ASSEMBLY 1 (7)60105 NEEDLE BEARING 1 (18)60112 BEARING 1 (16)60110 CRANK SEAL 1 (9)60106 BEARING 1 (10)60107 O-RING

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# DOYLE 619-4 AIR MOTOR

## MAINTENANCE SCHEDULE

**Monthly, remove vent and add 2 shots of grease into crank pin, while slowly rotating crankshaft.**

After every 4 months or 3000 hours of use (whichever comes first), remove the Head Cover (3), Crank Pin (5), upper Thrust Washer (6) and Needle Bearing (7).

Remove Cylinder Caps (15) and Rod Assemblies (12). Inspect Piston Seals (20) and Rod Assemblies (12) for wear and replace as required. Apply a fresh layer of recommended grease to the ends of the Rod Assemblies (12) and Piston Seals (20). Inspect Crank Pin (5), Thrust Washer (6) and Needle Bearing (7) for wear and replace as required.

Reassemble components in reverse order of removal – leaving off the Head Cover (3). Pump fresh recommended grease into the Grease Fitting (4) until grease comes out from under the Thrust Washer (6). Using a wrench on the drive end of the Crankshaft (8), rotate the Crankshaft to ensure the motor turns freely. Re-attach the Head Cover (3).

Refer to the ‘Assembly’ and ‘Disassembly’ instructions for more detailed instructions. Run and test motor for leaks prior to installation.

### **Recommended installation of repair kits when operating at a constant speed:**

<b>Motor Speed</b>	<b>Kit 619-4A</b>	<b>Kit 619-4B</b>
0-150 rpm	12 months	2-3 years
150-300 rpm	6-12 months	1-2 years
300+ rpm	To prolong the life of the motor we do not recommend running in excess of 300 rpm.	



## TECHNICAL DATA

Lubrication: No air lubrication required, grease crank pin bi-monthly.

Maximum Operating Pressure: 90 PSI 6 BAR

Maximum HP: ½

Maximum Speed: 600 RPM

Minimum Speed: 20 RPM

Operating Speed: 20 RPM to 300 RPM (max)

Recommended Grease: Calcium Sulfonate / Lithium Complex NGLI#2

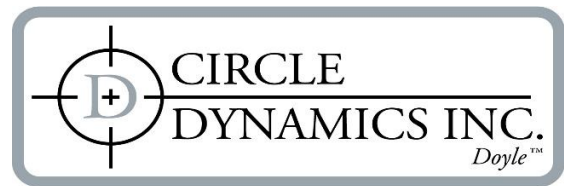
Rotation: Clockwise, Counter Clockwise

Torque: 26 in/lb

Air Consumption: 1.38 CFM @ 200 RPM / 9.75 CFM @ 600 RPM

## THE CIRCLE DYNAMICS INC. WARRANTY AND DISCLAIMERS

Items sold by Circle Dynamics Inc. and/or all Doyle Products are warranted to be free from defects in material and workmanship for a period of one year from the date of manufacture, provided said items are used according to Doyle Products said usages. Circle Dynamics Inc. liability is limited to the repair of, refund of purchase price paid for, or replacement in kind of at the sole option of Circle Dynamics Inc., any items proved defective, provided the allegedly defective items are returned to Circle Dynamics Inc. prepaid. There are no other warranties, expressed or implied, except as stated herein. There are no implied warranties of merchantability of fitness for a particular purpose, which are damages, if the possibility of such incidental or consequential damages has been made known to Circle Dynamics Inc., or is the direct result of a failure of a Doyle Product. Circle Dynamics Inc. reserves the right to discontinue the manufacture of any product or change product materials, design or specifications without notice.



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**Authorized Distributor**

Patent Pending  
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