

"Superior Products are the User's Advantage."

SERVICE MANUAL FOR CIRCLE DYNAMICS INC.

DOYLE 319-1 AIR MOTOR

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 Pressure Pot, Pail, Tank, or Barrel 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# 60688)



Fig. 1

REBUILD INSTRUCTIONS FOR DOYLE 319-1 AIR MOTOR

DISASSEMBLY

1. De-energize air motor from all sources of energy and disconnect from drive unit to prepare for disassembly.
2. Using a 1/8 allen wrench remove 3 Screws (2) from the top of the Motor Body (9).
Remove Head Cover (3)
3. Using a 1/8 allen wrench remove 4 Screws (2) form each Cylinder Cap (14). Remove Cylinder Cap (14) from the Motor Body (9) and discard O-ring (13) from each Cylinder Cap (14).
4. Using a 3/16 allen wrench slowly loosen Cap Screw (4) while holding the Crank Shaft (8) with a 9mm wrench
5. Slowly remove Cap Screw (4) while holding Connecting Rods with a downward force.
6. Remove all three Piston Assemblies (6) and four Spacers (5 & 17).

STOP HERE if using Piston Seal Kit 319-1A. Proceed to ‘Assembly Instructions’ #6-21.

Continue with Disassembly Instructions #7-13 if using Motor Repair Kit 319-1B.

7. Using snap ring pliers, remove snap ring (16) from the bottom of Crankshaft (8).
8. Using a 3 ton arbor press, place the motor upside down and press the crankshaft (8) out of the motor body (9).
9. Using snap ring pliers, remove snap ring (11) from the Crankshaft (8).
10. Remove and discard bearing (10) from the crankshaft (8).
Use caution not to dislodge the counterweight of the crankshaft (8) while removing the bearing.
11. Using Doyle bearing puller remove and discard bearing (15) from the motor body (9).
12. Using a pick, pull out seal (12) from both the upper and the lower end of the motor body (9).
13. Clean and dry all components for re-assembly.

ASSEMBLY

1. Install O-Ring (12) in both the upper and lower Motor Body Assembly (9). Lubricate O-Ring (12) with recommended grease (see technical data back page).
2. Using a 3 ton arbor press, Install new Bearing (10) on Crankshaft (8) and secure with Snap Ring (11).
3. Using a 3 ton arbor press, press Bearing (15) into the bottom of the motor body (9).
4. By hand, carefully so as not to damage the O-Ring (12), install the Crankshaft (8) into place. Press Crankshaft (8) the rest of the way using a 3 ton arbor press while supporting bearing (15).
DO NOT press on the counterweight of the crankshaft, as this may damage it.
At this point the crankshaft should move freely by hand. If you feel any tight spots or the crankshaft feels lumpy as you spin it by hand, you will need to send the motor back to the manufacturer for repair.
5. Install Snap Ring (16) onto bottom of the Crankshaft (8).
6. Install seal (13) into each of the three cylinder caps (14).
7. If applicable, install the new Piston Seal (7) onto the Rod Assembly (6) 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# 60596)
8. Lubricate the inside of the Cylinder Cap (14) and the outside of the Piston. Insert the Rod Assemblies (6) into the Cylinder Caps (14).
9. Install Spacer (5) into the recess of the Crankshaft (8).
10. As a unit, being sure that the 'spacer pocket' of the rod is facing up, install the first Rod Assembly (6) and Cylinder Cap (14) through the lowest opening in the Motor Body Assembly (9).
Be sure not to dislodge the spacer below.
11. Install four Screws (2) into the Cylinder Cap (14). Keep loose.
12. Install spacer (17) into the 'spacer pocket' of the Rod assembly (6).
13. Repeat steps 10 to 12 for remaining 2 Rod Assemblies (6).
14. Secure all three Cylinder Caps (14) by tightening screws (2) to 40 in/lbs of torque.
15. No spacer goes on top of the uppermost Rod Assembly (6).

16. Align all Rod Assemblies (6) and Spacers (5). Install Crank Pin (4) down through all 3 Rod Assemblies (6) and into the threaded hole on the top of the Crankshaft (8).
17. Tighten Crank Pin (4) to 80 IN/lbs
18. By hand (or using a 9mm wrench) turn the bottom of the Crankshaft (8) to be sure the Crankshaft and Pistons are moving freely.
19. If necessary (if the bearings feel lumpy), 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.
21. Connect motor to appropriate air supply, set speed and test for smoothness and leaks.

Tachometer instructions (if applicable):
(Part# 60688)

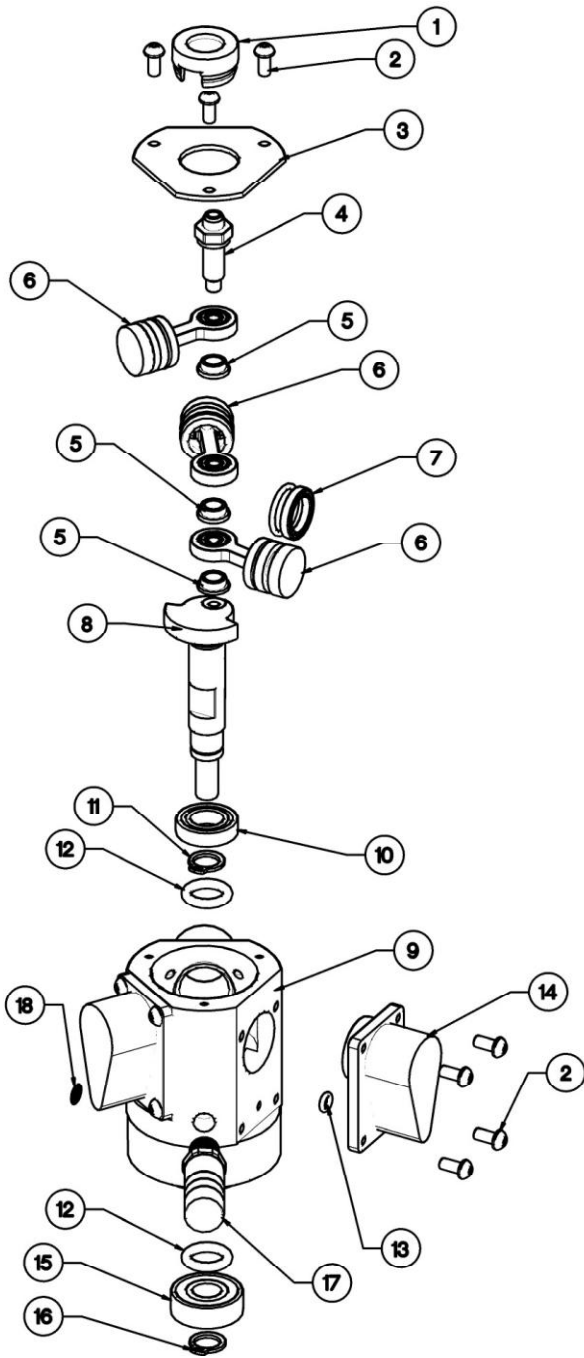
Depress tachometer button to display the current RPM. Release button when RPM has been confirmed.

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 Doyle Tachometer or the Doyle Speed Control Unit please contact us at:

rjones@circledynamicsinc.com

DOYLE 319-1 AIR MOTOR



KEY	PART #	QTY.	DESCRIPTION
1	60101	1	VENT
2	60118	15	SCREW
3	60578	1	HEAD COVER
4	60783	1	CRANKPIN
5	60784	3	SPACER
6	60838	3	ROD ASSEMBLY
7	60632	3	PISTON SEAL SET
8	60558	1	CRANKSHAFT
9	60561A	1	MOTOR BODY
10	60631	1	BEARING
11	60592	1	SNAP RING
12	60107	2	SEAL
13	60605	3	O-RING
14	60557	3	CYLINDER CAP
15	60112	1	BEARING
16	60113	1	SNAP RING
17	60410	1	MUFFLER
18	60361	1	SCREEN

KEY	PART #	QTY.	DESCRIPTION
30	319-1A	1	PISTON SEAL KIT Contains: 3 (7)60632 PISTON SEAL SET
31	319-1B	1	MOTOR REPAIR KIT Contains: 3 (7)60632 PISTON SEAL SET 3 (6)60838 ROD ASSEMBLY 1 (15)60112 BEARING 2 (12)60107 SEAL 1 (10)60631 BEARING
32	319-1C	1	2019 to 2021 CONVERSION KIT Contains: 3 (7)60632 PISTON SEAL SET 3 (6)60838 ROD ASSEMBLY 1 (15)60112 BEARING 2 (12)60107 SEAL 1 (10)60631 BEARING 1 (4)60783 CRANKPIN 3 (5)60784 SPACER

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TECHNICAL DATA

Lubrication: No air lubrication required, Grease piston and piston seals after 3000 hrs.

Maximum Operating Pressure: 90 PSI 6 BAR

Maximum HP: 1/8

Maximum Speed: 800 RPM (no load)

Minimum Speed: 20 RPM

Operating Speed: 20 RPM to 300 RPM (max)

Recommended Grease: Calcium Sulfonate / Lithium Complex NGLI#2
(DO NOT USE SOAP BASED GREASE)

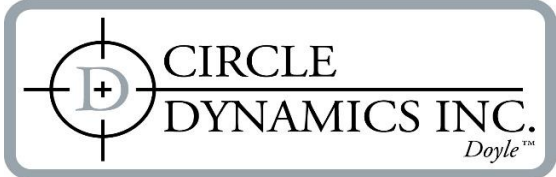
Rotation: Clockwise, Counter Clockwise

Torque: 8 in/lb

Air Consumption: 0.78 CFM @ 200 RPM / 4.50 CFM @ 800 RPM (no load)

THE CIRCLE DYNAMICS INC. WARRANTY AND DISCLAIMERS

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<p style="text-align: center;">Authorized Distributor</p> <p>Patent Pending Copyright 2014 Circle Dynamics Inc. All rights reserved. Models and specifications subject to change without notice.</p>	<div data-bbox="911 1423 1463 1598"></div> <p style="text-align: center;"><i>"Superior Products are the User's Advantage."</i></p> <p>Circle Dynamics Inc. 171 A Rink Street, Suite 150 Peterborough, Ontario, Canada K9J 2J6 Tel: 1-705-768-3338 Fax: 1-705-740-1975 Email: jdoyle@circledynamicsinc.com Web: www.circledynamicsinc.com</p>
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