



SERVICE MANUAL FOR CIRCLE DYNAMICS INC.

DOYLE DSO 59600 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 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.



REBUILD INSTRUCTIONS FOR DOYLE DSO 59600 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 (27) from Motor Head (12) and remove Head Cover (3).
3. Hold Crankshaft (8) with wrench while removing Crank Pin (5) with a 1-1/8 socket.
4. Remove Thrust Washer (6) from Rod Assembly (21).
5. Remove Needle Bearing (7) from centre.
6. Remove Screws (27) from each of the six Cylinder Caps (25). Remove Cylinder Caps (25) and Cap Seals (24). Discard Cap Seals.
7. For each cylinder, remove Cylinder Sleeve (23) and Rod Assembly (21) as one unit. Remove Sleeve Seal (22) from the Cylinder Sleeve (23). Discard Cylinder Seals.
8. Remove each Rod Assembly (22) from the Cylinder Sleeve (23) and remove the remaining Thrust Washer (6).
9. Remove Piston Seal (20) from the Rod Assembly (21). Discard Piston Seal.

STOP HERE if using Piston Seal Kit 59600A and proceed to 'Assembly Instructions' #8-18. Continue with Disassembly Instructions #10-16 if using Motor Repair Kit 59600B.

10. Remove Snap Ring (19) from Crankshaft (8) and press Crankshaft (8) up through the Body (15).
11. Remove Bearing (18) from the Body (15) and discard.
12. Remove Snap Ring (17) and Crank Seal (16). Discard Crank Seal.
13. Remove Bearing (9) from Crankshaft (8) and discard.
14. Remove O-Ring (10) from the Valve Bushing (14). Discard O-Ring.
15. **Only if absolutely necessary**, remove Motor Head (12) by removing the 3 Cap Screws (11). Press Valve Bushing (14) from the Body (15) and replace.

16. Remove the 6 O-Rings (13) and discard.

17. Clean and dry all components in a clean environment and prepare for re-assembly.

ASSEMBLY

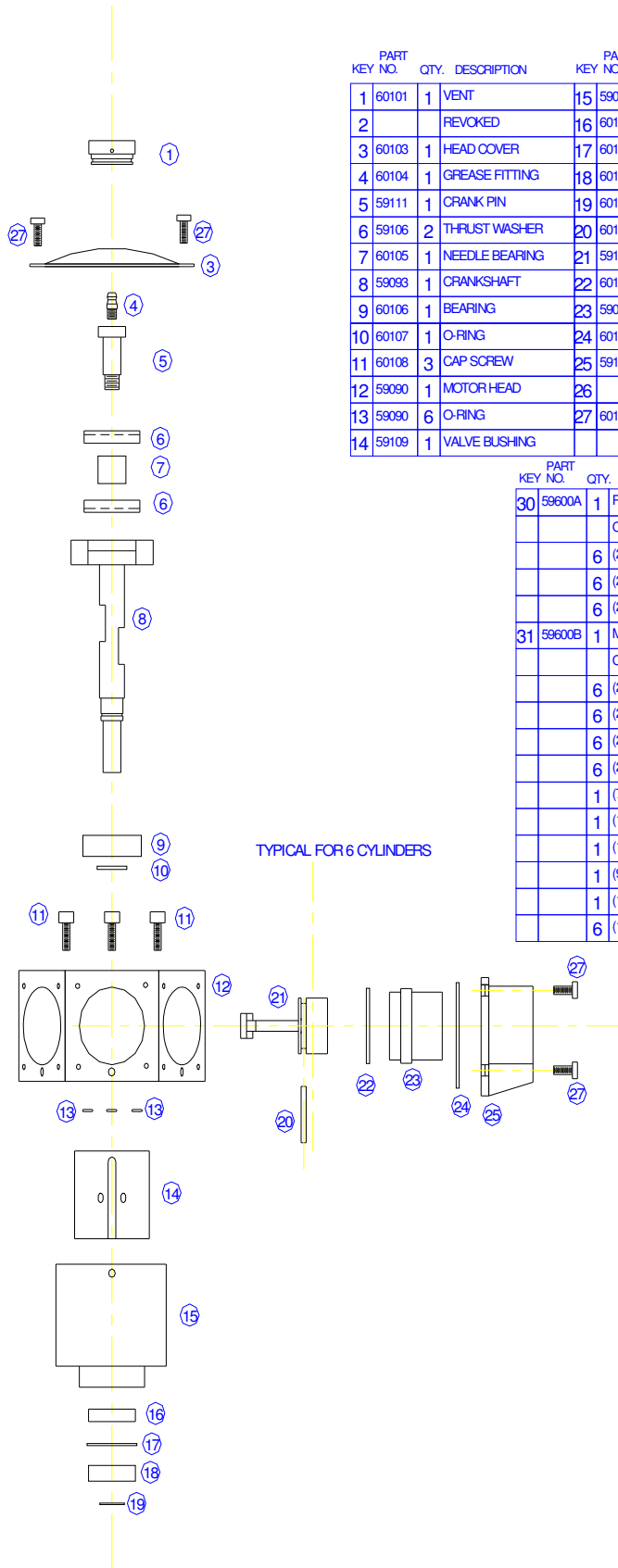
1. If Valve Bushing (14) has been removed, line up the guide in the Body (15) with the groove in the Valve Bushing (14) and press into the housing until flush with the Body.
2. Install the 6 new O-Rings (13) in the underside of the Motor Head (12).
3. Install the Motor Head (12) by inserting the 3 Cap Screws (11) loosely. Do not tighten until step #9.
4. Install O-Ring (10) in the Valve Bushing (14).
5. Lubricate the inside of the Valve Bushing (14) and the O-Ring (10) with recommended grease.
6. Install new Bearing (9) on Crankshaft (8).
7. Install new Crank Seal (16) in the drive end of the Body (15) with the seal lip towards the Valve Bushing (14) and secure it with the Snap Ring (17).
8. Carefully, so as not to damage the O-Ring, press the Crankshaft (8) into place.
9. Press into place the Bearing (18), while supporting the top end of the Crankshaft (8) to prevent the Bearing (9) from moving. Install the Snap Ring (19) and tighten Cap Screws (11).
10. Install the new Piston Seal (20) onto the Rod Assembly (21) with the seal lip facing the top of the piston. Lubricate with ample recommended grease.
11. Insert the Rod Assemblies (21) into the Cylinder Sleeves (23) by sliding the connecting rod end through the Cylinder Sleeve (23) first.
12. Install the lower Thrust Washer (6) onto the top end of the Crankshaft (8) with the flat side down.
13. Install the new Sleeve Seal (22) onto the Cylinder Sleeve (23) and install Rod Assembly (21) and Cylinder Sleeve (23) through the opening in the Motor Head (12). Hook the end of the Rod Assembly into the bottom of the Thrust Washer (6). Repeat for remaining 5 Rod Assemblies.

14. When all six Rod Assemblies and Cylinder Sleeves are in position, lubricate the ends of the Rod Assemblies (21) with grease and slide Needle Bearing (7) down through the centre of the Rod Assemblies.
15. Attach all six Cylinder Caps (25) over the Cylinder Sleeves (23) using Screws (27) and new Cap Seals (24). Tighten Screws (27) to 40 in/lbs of torque.
16. Install the top Thrust Washer (6) with the flat side up and slide Crank Pin (5) down through the centre of the assembly. 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 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,
20. Attach the Head Cover (3) with the Screws (27). Tighten to 40 in/lbs of torque.

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

NOTES:

DOYLE DSO 59600 AIR MOTOR



PART			PART				
KEY NO.	QTY.	DESCRIPTION	KEY NO.	QTY.	DESCRIPTION		
1	60101	1	VENT	15	59091	1	BODY
2			REVOKED	16	60110	1	CRANK SEAL
3	60103	1	HEAD COVER	17	60111	1	SNAP RING
4	60104	1	GREASE FITTING	18	60112	1	BEARING
5	59111	1	CRANK PIN	19	60113	1	SNAP RING
6	59106	2	THRUST WASHER	20	60114	6	PISTON SEAL
7	60105	1	NEEDLE BEARING	21	59113	6	ROD ASSEMBLY
8	59083	1	CRANKSHAFT	22	60115	6	SLEEVE SEAL
9	60106	1	BEARING	23	59092	6	CYLINDER SLEEVE
10	60107	1	O-RING	24	60116	6	CAP SEAL
11	60108	3	CAP SCREW	25	59105	6	CYLINDER CAP
12	59090	1	MOTOR HEAD	26			REVOKED
13	59090	6	O-RING	27	60118	27	SCREW
14	59109	1	VALVE BUSHING				

PART			
KEY NO.	QTY.	DESCRIPTION	
30	59600A	1	PISTON SEAL KIT
			CONTAINS
	6	(20)	60114 PISTON SEAL
	6	(22)	60115 SLEEVE SEAL
	6	(24)	60116 CAP SEAL
31	59600B	1	MOTOR REPAIR KIT
			CONTAINS
	6	(20)	60114 PISTON SEAL
	6	(22)	60115 SLEEVE SEAL
	6	(24)	60116 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
	6	(13)	60109 O-RING

MAINTENANCE SCHEDULE

After every 4 months or 3000 hours of use (whichever comes first), remove the Head Cover (3), Crank Pin (5), upper Thrust Washer (10) and Needle Bearing (7).

Remove Cylinder Caps (25), Cylinder Sleeves (23) and Rod Assemblies (21). Inspect Piston Seals (20) and Rod Assemblies (21) for wear and replace as required. Apply a fresh layer of recommended grease to the ends of the Rod Assemblies (21) and Piston Seals (20). Inspect Crank Pin (13), Thrust Washer (10) 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 a test motor for leaks prior to installation.

Once a year, or every 9000 hours of use (whichever comes first), install service kit 59600A.

MAINTENANCE LOG

Location	Date	Maintenance Performed	Parts Used

TECHNICAL DATA

Maximum Operating Pressure: 90 PSI 6 BAR

Maximum HP: ½

Maximum Speed: 800 RPM

Minimum Speed: 20 RPM

Recommended Grease: Calcium Sulfonate Complex NGLI#2


Rotation: Clockwise, Counter Clockwise

Torque: 26 in/lb

Air Consumption: 3 CFM @ 200 RPM / 12 CFM @ 800 RPM

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