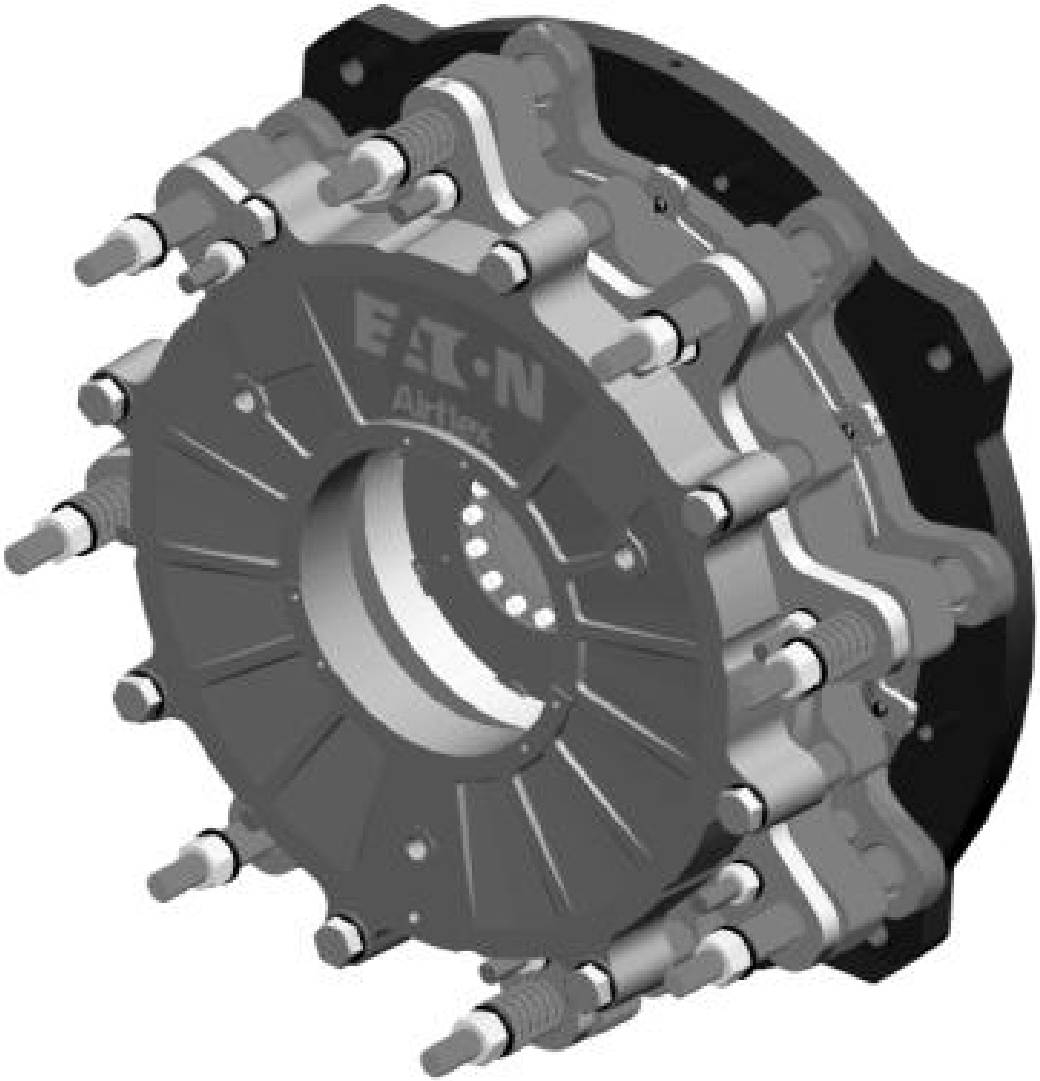
FHB 8110 Brake Assemblies Installation, Operation and Maintenance Manual

Airflex®



Powering Business Worldwide

⚠ Warning

Forward this manual to the person responsible for Installation, Operation and Maintenance of the product described herein. Without access to this information, faulty Installation, Operation or Maintenance may result in personal injury or equipment damage.

⚠ Caution

Use Only Genuine Airflex® Replacement Parts The Airflex Division of Eaton Corporation recommends the use of genuine Airflex replacement parts. The use of non-genuine Airflex replacement parts could result in substandard product performance, and may void your Eaton warranty. For optimum performance, contact Airflex:

In the U.S.A. and Canada: (800) 233-5890

Outside the U.S.A. and Canada: (216) 281-2211

Contents

FHB Brakes

Index of Tables

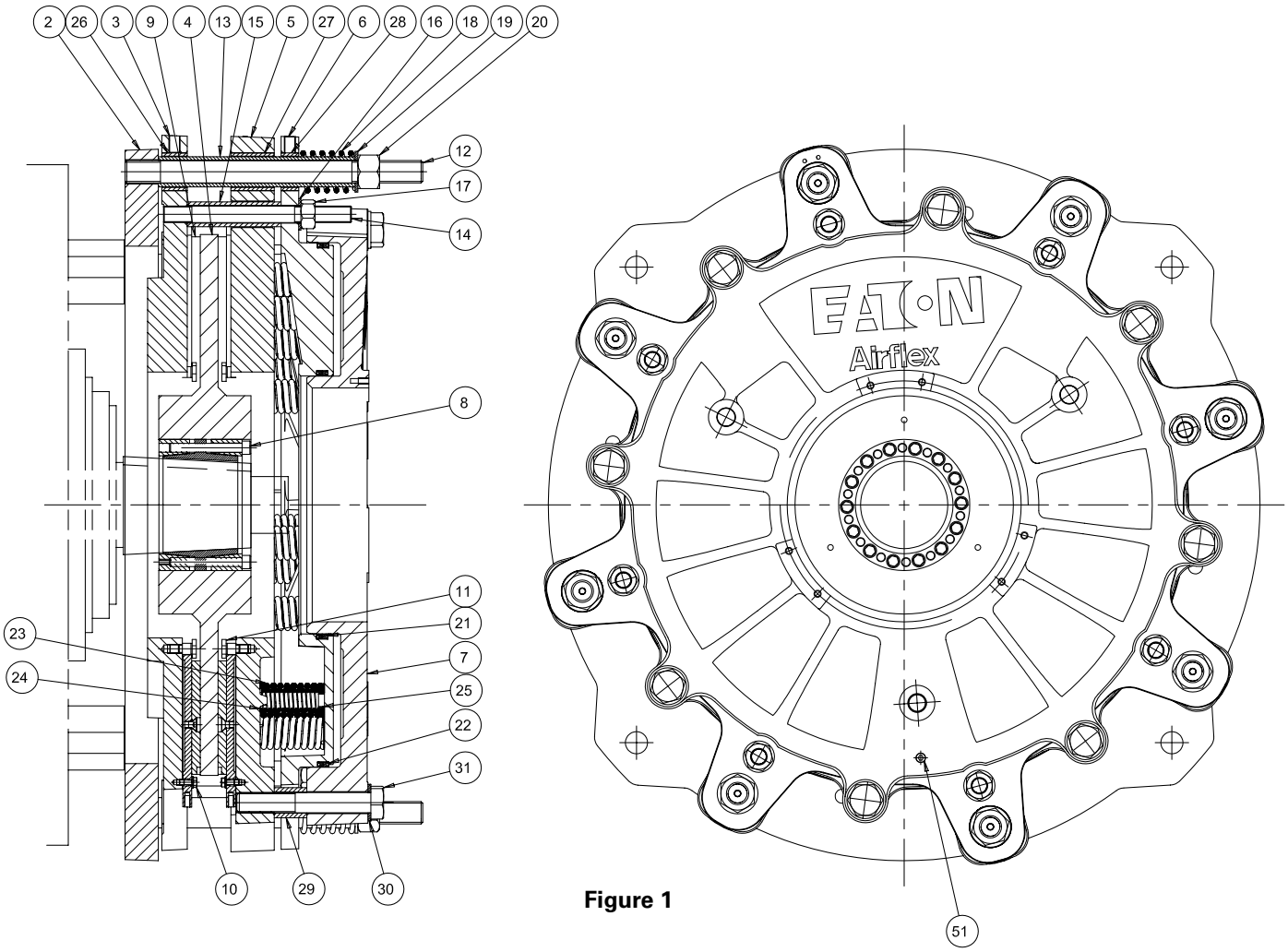


Figure 1

Item	Description	Item	Description	Item	Description
2	Mounting Flange	13	Large Clamp Tube	24	Outer Spring
3	Floating Plate	14	Support Stud	25	Spring Retainer
4	Disc	15	Spacer	26	Floating Plate Bushing
5	Pressure Plate	16	Flat Washer	27	Pressure Plate Bushing
6	Spring Housing	17	Self Locking Nut	28	Spring Housing Bushing
7	Cylinder	18	Release Spring	29	Power Head Spacer
8	Taper Shaft Lock	19	Flat Washer	30	Power Head Washer
9	Friction Pad Assembly	20	Sleeve Nut	31	Power Head Screw
10	Special Flanged Screw	21	Inner Seal	51	Drain Plug
11	Shoulder Screw	22	Outer Seal		
12	Main Stud.	23	Inner Spring		

1.0 INTRODUCTION

Throughout this manual there are a number of HAZARD WARNINGS that must be read and adhered to in order to prevent possible personal injury and/or damage to the equipment. Three signal words "DANGER", "WARNING", and "CAUTION" are used to indicate the severity of the hazard, and are preceded by the safety alert symbol ⚠

⚠ **Danger**
DeNotes the most serious injury hazard, and is used when serious injury or death WILL result from misuse or failure to follow specific instructions.

⚠ **Warning**
Used when serious injury or death MAY result from misuse or failure to follow specific instructions.

⚠ **Caution**
Used when injury or product/equipment damage may result from misuse or failure to follow specific instructions.

It is the responsibility and duty of all personnel involved in the installation, operation, and maintenance of the equipment on which this device is used to fully understand the Danger, Warning and Caution procedures by which hazards are to be avoided.

1.1 Description

1.1.1 The Airflex® Model FHB brakes are designed for heavy-duty industrial applications where spring set (power off) braking is required.

1.1.2 The Airflex FHB brake is supplied with long wearing, NON-ASBESTOS friction material and solid cast, rotating disc.

1.1.3 138FHB indicates the brake uses one 38 inch diameter disc.

1.1.4 This manual includes metric equivalents usually shown in parentheses (#) following the U.S. measurement system value. Be sure to use the correct value.

1.2 How It Works

1.2.1 Referring to Figure 1, disc (4) is mounted on the shaft which is to be stopped. The brake assembly is attached to the machine frame or reaction bracket. As air pressure is applied through the ports in the cylinder (7), the cylinder and pressure plate (5), which are attached to each other with power head screws (31), power head washers (30) and power head spacers (29), and move away from the mounting flange (2). Similarly the spring housing (6) and floating plate (3), which is attached to each other with support stud (14), self-locking nuts (17), flat washers (16) and spacer (15), move towards the mounting flange (2). The springs (23, 24) are compressed between pressure plate (5) and spring housing (6) and clamp force is removed from the disc (4) which is fixed on the shaft via taper shaft lock (TSL)(8). The shaft is then free to rotate.

1.2.2 As air pressure is exhausted, the springs (23,24) force the pressure plate (5) towards the mounting flange (2) and the spring housing (6) which in turn force the floating plate (3) away from the mounting flange (2), clamping the disc(4) between the friction pad assembly (9) which are attached to the pressure plate (5) and floating plate (3).

2.0 INSTALLATION

⚠ **Warning**
Prior to installation of the FHB brake, make sure that the machinery will remain in a secured position. Failure to do so could result in serious personal injury or possibly death.

⚠ **Warning**
This section of the manual is intended for a 138FHB brake to be installed on a GE824 motor ONLY.

2.1 Preparation

2.1.1 Inspect the mounting lugs on the motor for broken welds or improper location.

2.1.2 All mounting lugs should be flat and within a common perpendicular plane to motor shaft. To verify this, number each mounting lugs one thru four. Place a magnetic base and dial indicator on the motor shaft, positioning the tip of the indicator on mounting surface of the lug marked #1 and zero the dial indicator. See Figure 2.

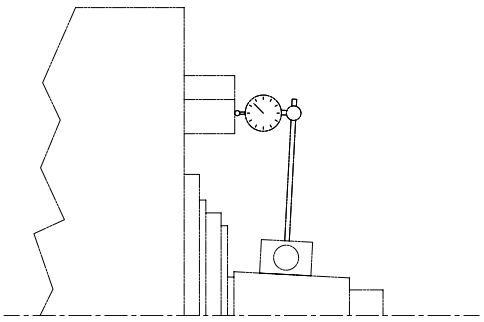


Figure 2

TABLE 1
Shim Calculations

Lug Number	Column A Measure Motor Shaft to Brake Mounting Lug and Record	Column B Shim needed to make Motor shaft to Motor Lugs equal (in.)	Column C Nominal shim (Required)	Column D Add Nominal shim to equaling shim and install as required for each motor lug
Lug 1	0.000" (0.00mm)		0.060" (1.52mm)	
Lug 2			0.060" (1.52mm)	
Lug 3			0.060" (1.52mm)	
Lug 4			0.060" (1.52mm)	

1. Record measurements from of shaft to lug positions in column A.
2. In column B record a zero for the lowest measured value from column A
3. To calculate the values for the remaining lugs in column B add the difference between the lowest measured in column A and the value recorded for that lug. For example below, if lug 3 is the lowest measured value and equals -4, and lug 2 equals 3, then the difference between the two values is 7. Enter this value into column B for the corresponding lug.
4. Add the values recorded in column B to the value in column C and record the sum in column D.

Example - Shim Calculations

Lug Number	Column A Measure Motor Shaft to Brake Mounting Lug and Record	Column B Shim needed to make Motor shaft to Motor Lugs equal (in.)	Column C Nominal shim (Required)	Column D Add Nominal shim to equaling shim and install as required for each motor lug
Lug 1	0.000" (0.00mm)	0.004	0.060" (1.52mm)	0.064"
Lug 2	0.003"	0.007"	0.060" (1.52mm)	0.067"
Lug 3	-0.004"	0.000"	0.060" (1.52mm)	0.060"
Lug 4	0.010"	0.014"	0.060" (1.52mm)	0.074"

2.1.3 Measure the axial distance from the motor shaft to the remaining three brake mounting lugs on the motor. Be sure that the motor shaft is in the same axial position when measuring each mounting lug location. Record these values in Table 1 column A. With the values recorded in Table 1 column A calculate the final shim thickness required at each mounting lug location and record this value in Table 1 column D.

⚠ **Caution**
Failure to maintain the same axial position when measuring the gap between the shaft and each motor lug could cause incorrect shimming and alignment of the brake.

⚠ **Caution**
Improper alignment may result in damage or premature wear to the motor shaft and bearings or to the brake components.

2.1.4 Measure the total motor shaft float by thrusting the shaft to its mechanical limits. Ensure that the motor shaft float is within the manufacturer's specification. As a reference, GE800 series motors should be within a minimum of 0.109" (2.77 mm) and a maximum of 0.172" (4.36 mm).

Note: If the motor shaft endplay is outside of the manufacture's specification, motor repairs may be required. Consult the motor manufacturer for corrective procedures.

⚠ **Warning**
Excessive shaft endplay may result in premature wear or damage to the brake components.

⚠ **Caution**
Excessive jacking or prying when checking endplay may result in damage to bearings, bearing cartridges, or related components.

2.1.5 Place the brake on a clean working area with the mounting flange facing down.

2.1.6 Loosen all locking screws (8D) of taper shaft lock (TSL) (8) by a minimum of four turns and transfer at least two of the locking screws (8D) to push-off threads in front clamp collar (8A) to disengage this part from center collar (8C). Similarly, transfer at least two locking screws (8D) to push-off threads in center collar (8C) to disengage this part from rear clamp collar (8B). See Figure 3.

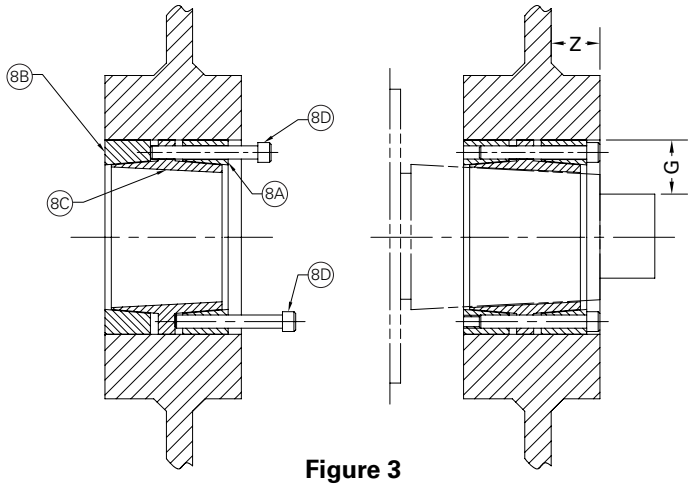


Figure 3

2.1.7 It is suggested to cut four 12" (305 mm) long 1-1/2-6NC-2 sections of threaded rod to assist in the installation of the brake.

2.2 Mounting the Brake

2.2.1 Install a 12" (305 mm) long 1-1/2-6NC-2 section of threaded rod into each of the brake mounting lug locations on the motor.

2.2.2 Rig the FHB brake with soft slings and hoist it into position onto the motor so that the drain plug (51) on the cylinder (7) is located at or near the 6 o'clock position.

⚠ **Warning**
Use only inspected / certified lifting and rigging equipment to avoid injury and possible death.

⚠ **Caution**
For proper operation and service life, the FHB brake must be mounted concentric and at right angles to the shaft within the limits shown on Table 2.

TABLE 2

Alignment Requirements

Size	Concentricity (Parallel, TIR) of Shaft and Element	Perpendicularity (Angular, TIR) of Mounting Flange to Shaft*
138 FHB	.010 (0.25)	.020 (0.51)

* Perpendicularity measured near the O.D. of the mounting flange

2.2.3 One at a time, remove the threaded rods installed at each lug location and replace each with a 1-1/2" 6NC X 5.00" Grade 8 hex head screws and lock washers (customer provided). Tighten the hex head screws to the appropriate specification. See Table 3. Ensure the required shims calculated in Table 1 column D are installed between the mounting lug and the mounting flange (2) prior to tightening the hex head screws. See Figure 4.

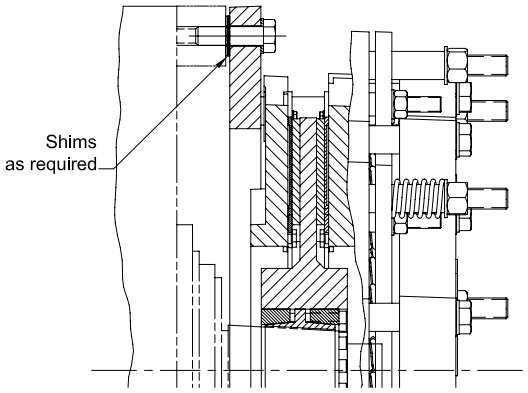


Figure 4

2.2.4 Remove the soft slings after the brake is secured to the motor.

2.2.5 Attach a temporary flexible air piping to one of the air ports on the cylinder (7).

2.2.6 Install two 1" - 11 1/2 NPT pipe plugs into the remaining air ports on the cylinder (7).

2.2.7 Apply air to the cylinder (7) to release the brake. The disc will initially drop down onto the small studs.

Note: Adequate release pressure should be applied to ensure that the disc (4) is free to move.

⚠ **Warning**
Maximum allowable air pressure is 120 psig (8.2 bar). Application of pressure exceeding maximum allowable may result in damage to the brake.

⚠ **Caution**
Pinch points exist when actuating the brake assembly. Keep away from the assembly when applying or releasing the air pressure to avoid injury.

2.2.8 Rotate the disc (4) using any of the four available M12 threaded holes to position one of the M12 holes at the top 12 o'clock position. Use care to prevent damage to the threaded M12 holes.

2.2.9 An M12 eyebolt can now be assembled into the top hole. Suspend the disc by use of a hoist or other certified lifting device.

⚠ **Warning**
Use only inspected / certified lifting and rigging equipment to avoid injury and possible death.

2.2.10 Visually inspect the disc (4) and adjust the position of the disc using a hoist so that the open bore of the disc is concentric to the motor shaft.

2.2.11 Make sure that the locking screw (8D), taper, shaft and bore contact areas are clean and lightly oiled and that all collar slits of the TSL (8) are aligned.

Note: Use CRC Industries 3-36® lubricant or equivalent to lubricate the TSL screws. See Table 3.

⚠ **Caution**
Do NOT use molybdenum disulfide (anti-seizing compound or similar lubricants) on any part of the TSL installation.

2.2.12 Position the slits of the TSL (8) approximately 180° from the keyway in the motor shaft if this keyway exists.

TABLE 3
Fastener Description & Assembly Torque

Item	Fastener Description		Assembly torque. ft-lbs (Nm)	Lubed/Loctite
20	Sleeve Nut	M39X4.0 Steel Class 8	980 (1329)	30 wt. oil or anti-seizing compound
17	Self Locking Nut	M30X3.5 Steel Class 8	400 (542)	30 wt. oil or anti-seizing compound
8	Taper Shaft Lock Screw	M16 Grade 9	262 (355)	CRC Industries 3-36 lubricant or equivalent
11	Shoulder Screw	M16X2.0 Grade 8	50 (68)	Loctite #262
10	Special Flange Screw	M10X1.5	10 (13)	Loctite #242
31	Power Head Screw	M36X4.0 Grade 9	980 (1329)	Loctite #262
Motor Mounting Screw	Customer Supplied	1-1/2 6NC X 5.00 Grade 8	800 (1085)	Dry

⚠ **Caution**
The TSL (8) should be positioned so that slits in TSL collars (8A, 8B) that contact the shaft are located approximately opposite the keyway. In addition, a locking screw (8D) should be centered directly over the keyway.

2.2.13 The TSL (8) can now be inserted into the hub bore of the disc (4) by pushing against the face of front clamp collar (8A) while ensuring that rear clamp collar (8B) is not engaged at the tapers during this phase.

Note: Check to ensure that axial movement of clamp collars (8A, 8B) are not restricted. These are used for the release of the TSL (8) connection.

2.2.13.1 Push the TSL (8) into the bore and onto the motor shaft as far as possible by hand.

2.2.13.2 Using a brass bar or other soft metal bar use a hammer to tap the TSL (8) onto the motor shaft as far in as possible until the internal taper of the TSL bottoms out on the external taper of the motor shaft. This will be detected by the feel of the hammer on the soft metal bar. The hub of the disc (4) should be in-line with the taper end of the motor shaft. See Figure 5.

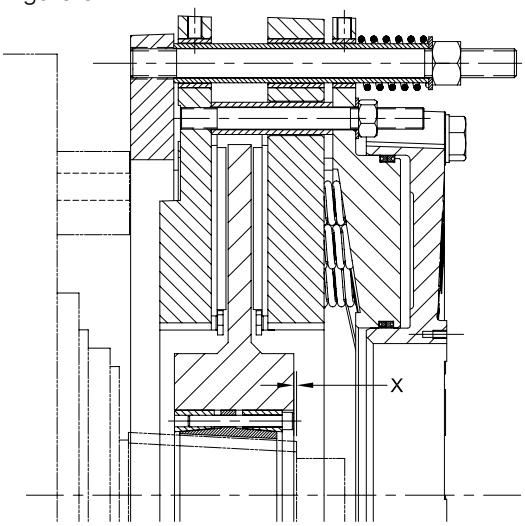


Figure 5

2.2.13.3 Hand tighten all locking screws (8D) of the TSL (8) until the heads of the screws make initial contact with the face of the center collar (8C).

2.2.13.4 Remove the lifting tension on the disc (4) created by the hoist or certified lifting device.

2.2.13.5 Using an allen wrench, continue tightening the locking screws (8D) by hand in a continuous sequence, turning each locking screw approximately one quarter turn during each pass around the series of locking screws until the locking screws can no longer be tightened by hand. Confirm that the front of the front clamp collar (8A) is parallel with the end of the motor shaft.

2.2.13.6 Use torque wrench and set it approximately 5% higher than the specified tightening torque shown in Table 3. Tighten locking screws (8D) in either a clockwise or counterclockwise sequence (it is not necessary to tighten in a diametrically opposite pattern), using only 1/4 (i.e., 90°) turns for several passes until 1/4 turns can no longer be achieved.

⚠ **Caution**
When tightening locking screws (8D), it is important to follow the installation procedure outlined above, which specifies equal 1/4 turns of each locking screw. Failure to follow these instructions could result in excessive tightening of the screw over the keyway, possibly causing permanent deformation of the TSL collars(8A, 8B, 8C). Even after 1/4 turns can no longer be achieved, it is important to continue to use equal turning angles for every screw until the specified tightening torque is reached.

2.2.13.7 Continue to apply overtorque for 1 to 2 more passes. This is required to compensate for a system-related relaxation of locking screws since tightening of a given locking screw (8D) will always relax adjacent locking screws. Without overtorquing, an infinite number of passes would be needed to reach specified tightening torque.

2.2.13.8 Reset torque wrench to specified torque as shown in Table 3 and check all locking screws (8D). No locking screw should turn at this point, otherwise repeat step 2.2.13.6 for 1 or 2 more passes. Note: It is not necessary to re-check tightening torque after equipment has been in operation.

2.2.14 Verify the front clamp collar (8A) of the TSL (8) is flush with the taper at the end of the motor shaft and that the TSL is retracted within or flush with the hub portion of the disc (4). See Figure 6.

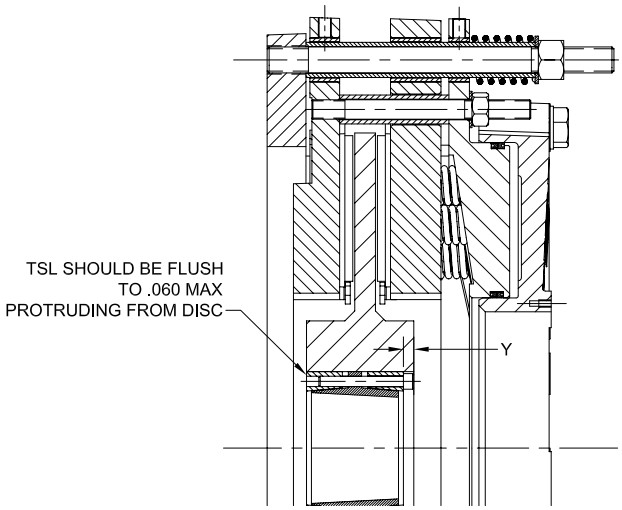


Figure 6

2.2.15 Remove the lifting devices and eyebolt previously installed in the lifting hole of the disc (4).

2.2.16 Thrust the motor shaft to its mechanical limit away from the motor frame. Measure the gap between the disc (4) and the friction lining mounted on the pressure plate (5). Thrust the motor shaft to its mechanical limit towards the motor frame and measure the gap between the disc (4) and the friction lining mounted on the floating plate (3). Verify that the measured gaps are within 0.020" (0.51 mm) of each other. Running gaps are shown in Figure 7.

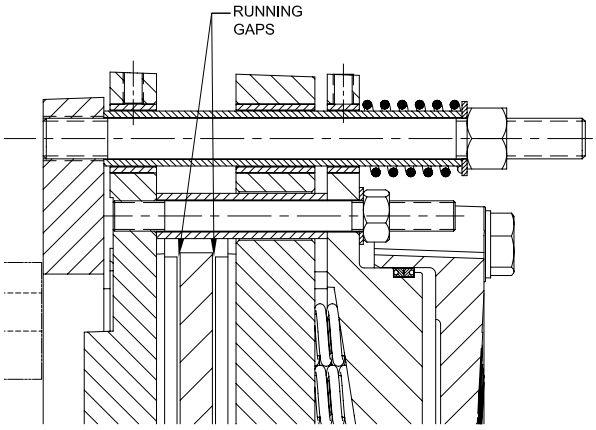


Figure 7

2.2.17 If the running gaps are not within 0.020" (0.51 mm) of each other, loosen all the mounting screws. One at a time, remove each mounting screw and add or remove an equal thickness of shim at each lug to obtain running gaps that are within 0.020" (0.51 mm) when the motor shaft is thrust to its mechanical limits. Running gaps are shown in Figure 7. Tighten the mounting screws to specification. See Table 3. Repeat step 2.2.16 to verify that the gaps are correct.

2.2.18 Measure the concentricity between the disc (4) and the outer edge of the friction pad (9). Ensure that it's within the required specification. See Table 2. If the concentricity is out of the required specification loosen the mounting screws and adjust the brake position to obtain the required tolerance. Re-tighten the mounting screws to specification and verify. See Table 3.

2.2.19 Exhaust the air pressure from the temporary air connection and engage the brake. Remove the temporary air connection from the cylinder.

⚠ **Caution**
Pinch points exist when actuating the brake assembly. Keep away from the assembly when applying or releasing the air pressure to avoid injury.

2.3 Air Supply System

⚠ **Warning**
Maximum allowable air pressure is 120 psig (8.2 bar). Application of pressure exceeding maximum allowable may result in damage to the brake.

⚠ **Caution**
Minimum release pressure for particular spring configuration should be observed. Operating pressure below minimum will result in brake drag, excessive heat and wear, and damage to brakes components.

Note: Since the air control arrangement will vary from one application to the next, a specific description cannot be presented. Brake response is dependent upon a good air system arrangement. The following are some general guidelines for installing the air control components.

2.3.1 The 138FHB brake has three 1" - 11 1/2 NPT ports in the cylinder (7). It is recommended that all three ports be used and connected with air bridge piping.

2.3.2 The air drain plug (51) should be located near the 6 o'clock position to facilitate purging of moisture that may accumulate in air system.

2.3.3 Use full size piping consistent with the control valve size. All piping should be free of metal chips, cutting compound, and any other foreign matter.

2.3.4 Keep the number of elbows to a minimum to ensure consistent response.

2.3.5 Spool type solenoid valves are not recommended. Use poppet type valves and locate them as close as possible to the brake.

2.3.6 The final connection to the brake inlet ports must be made with flexible hose.

2.3.7 The FHB brake does not require lubricated air; however solenoid valve may. Consult the valve manufacturer.

2.3.8 Use of an in-line air filter is recommended to help prevent excessive moisture and contamination from entering the solenoid valve and brake.

2.3.9 Filters and regulators should be located prior to solenoid valve, to ensure proper brake response.

⚠ **Warning**
Locating filters and regulators between the brake and solenoid valve may result in inadequate brake response.

2.3.10 A pressure switch should be located in the air supply line to the brake and interlock with the equipment electrical controls. Locate the pressure switch on or as close as possible to the brake.

⚠ **Caution**
Pressure switches located too far from the brake may not detect air leakage near or within the brake assembly.

2.3.11 Installation of limit switches or proximity sensors may be desired to detect full mechanical release of the brake prior to operation of the machinery.

2.3.12 Apply the required air pressure to the brake up to 120 psig (8.2 bar) max and verify that no air leaks exist. If air leaks are found, repair and test until the air system is free from air leaks.

2.3.13 Install all the necessary safety guarding as required.

⚠ **Warning**
Pinch points exist during operation when actuating the brake assembly. Keep away from the assembly when applying or releasing the air pressure to avoid injury.

3.0 OPERATION

⚠ **Warning**
Ensure adequate safety guarding is installed prior to operation.

3.1 Pressure & Speed Limits

3.1.1 Maximum applied pressure is 120 psig (8.2 bar). Minimum pressure required to release the brake is 90 psig (6.2 bar).

⚠ **Warning**
Maximum allowable air pressure is 120 psig (8.2 bar). Operation at pressures exceeding maximum may result in damage to the FHB components.

3.1.2 Maximum freewheeling disc (4) speed is shown in Table 4.

TABLE 4
Speed Limit

Brake Size	Max. Speed
Brake Size	Max. Speed
138FHB	950 RPM

⚠ **Warning**
Operation at disc (4) speed exceeding the maximum allowable may result in exposure to personal injury or product/equipment damage.

3.2 Initial Operation

3.2.1 The non-asbestos friction lining (9C) used on FHB brakes may not develop rated torque as a short wear in period is required. See section 3.3 for burnishing procedures if accelerated wear-in is desired.

3.2.2 During initial startup, monitor axial travel of pressure plate (5), floating plate (3), and disc (4). Due to various influences the motor may drift axially. If the discs remain in constant contact with the friction material, shim adjustment of the brake or motor bearing repair may be required. The disc should rotate freely with no contact to the friction lining (9C) while the brake is fully disengaged. See the installation section 2.2.16 thru 2.2.18 for shim adjustment procedures.

⚠ **Caution**
Failure to shim the brake properly may cause premature wear of brake components. Excessive heat may be generated from improper shimming, resulting in damage to brake and possible torque loss.

⚠ **Caution**
Armature end play in excess to manufacturer's maximum specification of 11/64" (4.37 mm) may result in premature wear and damage to the brake components.

3.2.3 If the brake engagement appears harsh, a flow control valve may be installed in the brake air supply line. When using a flow control valve, install so free flow is to the brake and restricted flow is away from the brake.

⚠ **Caution**
Excessive restriction of the brake exhaust air will result in long stopping times and inconsistent stopping position and may also result in overheating and damage to the brake components.

3.3 Burnishing Procedures

3.3.1 In order to improve initial operation and brake torque, it is suggested that the non-asbestos friction material used in the FHB brakes be worn-in prior to normal operation to improve contact of the mating friction lining (9C) surfaces.

⚠ **Caution**
The non-asbestos friction lining (9C) used on FHB brake may not develop rated torque, as a short wear-in period is required. Machine operation should therefore be monitored closely until the friction lining wears in.

3.3.2 The shaft on which the brake disc (4) are mounted should be free to rotate to allow for run-in. Disconnect any gearing or wire ropes from equipment to allow for freewheeling of the motor if necessary.

3.3.3 Release the brake by applying full release pressure through the ports in the cylinder to allow the brake to freely rotate.

⚠ **Caution**
Excessive slipping of brake will result in damage to the brake components.

3.3.4 Run the motor to achieve a brake disc (4) speed listed in Table 5. Rapidly exhaust the air pressure in the brake to the pressure listed in Table 5. Slip the brake for the time specified in Table 5, but DO NOT ALLOW THE BRAKE TO SLIP FOR MORE THAN THE TIME SPECIFIED in Table 5.

⚠ **Caution**
Slipping the brake at increased time intervals, speeds, pressures or temperatures other than specified may result in damage to the brake components.

⚠ **Caution**
Brake pressures listed in Table 5 are based on the total quantity of springs (23) (24) in accordance with the motor size. If the brake contains spring quantities different than listed in Table 5 consult Eaton/Airflex engineering for proper brake pressure to wear-in the brake.

3.3.5 After the brake has engaged/slipped for up to the maximum slip time specified in Table 5, quickly apply full air pressure to completely release the brake. Smoke rising from the brake should be expected. Freewheeling the brake discs at speeds up to the maximum freewheeling speed in Table 5 allows the brake discs to cool to a temperature at or below 120°F (49°C). The use of fans or clean, dry compressed air can be used to accelerate the cooling process.

⚠ **Caution**
Use proper safety protection when using forced ventilation.

Note: The brake pressure listed in Table 5 should provide a dynamic torque target value as listed and resultant power target at the brake speed listed. Since new friction torque will be lower at the start of wear-in procedure, pressure may need to be lowered to achieve the target torque. An adequate control and torque monitoring system must be used if pressure values less than those listed are used for wear-in. Target torque should be monitored to correspond to values listed.

3.3.6 Monitor the brake discs temperature during slipping and cooling. Do not allow the brake discs temperature to exceed 250°F (121°C).

3.3.7 Repeat steps 3.3.3 through 3.3.6 for the number of cycles shown in Table 5 to allow for adequate wear-in of the brake. Allow the brake disc to completely cool to ambient temperature prior to testing the torque capacity of the brake or returning it to service.

TABLE 5
Wear-in Parameters

Brake Size	Number of Springs	Motor Size	Brake Release Pressure psi (bar)	Brake Slip Pressure psi (bar)	Slip Time sec	Slip Speed rpm	Maximum Free Wheeling Speed rpm	Maximum Temp at Start of Slip °F (°C)	Maximum Temp at End of Slip °F (°C)	Wear-in Cycles Required	Power Target HP	Brake Dynamic Torque Target in-lb. (nm)
138FHB	28	GE 824	65 (4.48)	38 (2.62)	60	100	950	120 (48.8)	250 (121.1)	15	105	66,064 (7464.2)

3.4 Periodic Inspection

3.4.1 As the friction lining (9C) wears, the brake torque will be reduced somewhat and adjustment of the stopping position controls (flow control or limit switch) will be necessary. See the maintenance section 4.4 for the friction lining wear limit and replacement procedure.

3.4.2 Periodically check for air leakage in the area of the inner and outer seals (21) (22). For replacement refer to maintenance section 4.2.

3.4.3 Moisture that may accumulate in brake cylinder (7) can be purged on 138FHB brake. With pressure exhausted from cylinder, remove the pipe plug (51) at the 6 o'clock position on the cylinder, and apply low pressure to assist in expelling any excess moisture. After draining the cylinder, reinstall the pipe plug, applying a pipe thread sealant on the threads prior to installation.

⚠ **Caution**
Applied air pressure greater than 10 psi should not be used to when draining the cylinder (7). Use adequate shielding to avoid contact with direct spray from moisture being purged from cylinder.

3.4.4 Periodically inspect brake for abnormal wear of other brake components, looseness, vibration and excessive brake dust.

3.4.5 Periodically observe the rotating disc (4) with brake released. Ensure the disc doesn't come in contact with the friction lining(9C). Possible causes of disc contact may include wear or contamination of the clamp tube or bushing, disc imbalance, warped disc, or excessive shaft float.

3.4.6 Pneumatic and electrical control interlocks should be periodically checked for correct settings and operation.

4.0 MAINTENANCE

⚠ **Warning**
Prior to performing any maintenance on the FHB brake, make sure the equipment is in, and will remain in, a safe condition. Failure to do so could result in serious personal injury or possibly death.

⚠ **Caution**
When replacing components, use only genuine, Airflex replacement parts. Use of other materials may severely affect performance.

4.1 Wear Limits

4.1.1 Wear limits for FHB components are shown in Table 6. If any wear limit has been reached or exceeded, that component must be repaired or replaced.

TABLE 6
Wear Limits

Item	Component Description	Description	Wear Limit	Remarks
3 5 6	Floating Plate Pressure Plate Spring Housing	Original Bushing Hole Diameters	Maximum hole diameter is 2.6624 (67.624 mm)	Replace the component if the maximum hole diameter has been exceeded.
4	Disc	Friction Wear Surfaces	Maximum wear is 0.045 (1.12 mm) on the friction surface.	Original thickness for 138FHB is 1.25 (31.75mm). Wear will be in the form of circular grooves on the iron surface.
7	Cylinder	Seal Area	Maximum wear is 0.005 (0.13 mm)	Wear will be the form of grooves where the seals contact.
9	Friction Pad	Friction Material	Fully worn at the bottom of wear groove. See Figure 9. Friction material must also be replaced when contaminated with oil or grease.	For replacement procedure see section 4.4. The wear groove in a new friction lining is 0.25 (6.35 mm)
13	Clamp Tube	Reaction Area	Maximum wear is 0.015 (0.38 mm)	Wear will be in the form of a notch or step on the side of the tube.
15	Spacer	Reaction Area	Maximum wear is 0.015 (0.38 mm)	Wear will be in the form of a notch or step on the side of the tube.
18	Release Spring	Spring Free Height	Original Free Height 5.00 (127.00 mm) Minimum Free Height 4.67 (118.6 mm)	Springs must be replaced in complete sets.
23	Inner Spring	Spring Free Height	Original Free Height 6.78 (172.21 mm) Minimum Free Height 6.50 (165.1 mm)	Springs must be replaced in complete sets.
24	Outer Spring	Spring Free Height	Original Free Height 6.65 (168.91 mm) Minimum Free Height 6.37 (161.8 mm)	Springs must be replaced in complete sets.
26 27 28	Bushings	Bushings	Maximum wear is 0.031 (0.80 mm)	Wear will be in the form of elongation of the bushing bore. Original bore diameters are 2.209 (56.109mm)

4.2 Cylinder Seal Replacement

⚠ **Warning**
Prior to the removal or installation of the FHB cylinder, make sure that the machinery will remain in secured position. Failure to do so could result in serious personal injury or possibly death.

⚠ **Caution**
Pinch points exist on the brake assembly. Keep away from the assembly when applying or releasing the air pressure to avoid injury.

Note: Approximate weights for the brake, selected assemblies, and selected components are listed in Table 7 for hoisting and rigging purposes.

4.2.1 Match mark the mounting flange (2), floating plate (3), pressure plate (5), spring housing (6), and cylinder (7) for orientation during reassembly.

4.2.2 Disconnect the air supply lines and remove the power head screws (31), washers (30) and power head spacers (29) attaching the cylinder (7) to the pressure plate (5).

⚠ **Warning**
Before removing the power head screws (31) make sure that all of the self locking nuts (17) are in place and are tightened to the torque value specified in Table 3. Removing the power head screws while the self locking nuts are in a loose condition may cause personal injury and/or damage to the brake.

Note: If a support stud (14) should happen to come loose, remove it completely and clean the threads on the stud and the threads in the floating plate (3). Apply Loctite® Loc-Quic® Primer Grade "T" to the threads. After the threads have dried, apply Loctite #271 and assemble the shorter length threads of the stud into the floating plate. The end of the stud must not extend past the surface of the floating plate.

4.2.3 Carefully slide the cylinder (7) off of the spring housing (6).

⚠ **Warning**
Use only inspected / certified lifting and rigging equipment to avoid injury and possible death.

⚠ **Caution**
Do not use compressed air to remove the cylinder (7) from the spring housing (6).

4.2.4 Remove the cylinder seals (21, 22) from the spring housing (6) and thoroughly clean the cylinder (7) and the seal grooves in the spring housing.

4.2.5 Carefully examine the seal surfaces in the cylinder (7). If the surfaces have been damaged or worn to the point as indicated on Table 6, the cylinder must be replaced.

4.2.6 Clean and check the condition of the threaded holes in the pressure plate (5) and the condition of the power head screws (31) for galling or damage. Repair or replace prior to reassembly.

4.2.7 Lubricate the seal grooves in the spring housing (6) with Molykote® M55 grease prior to inserting the new seals.

TABLE 7
Component and Assembly Weights

Item #'s	Description	Approximate Weight
2	Mounting Flange	590 LBS (268 Kg)
3, 9	Floating Plate with Friction Pad Assembly	620 LBS (281 Kg)
4	Disc	516 LBS (234 Kg)
5, 9	Pressure Plate with Friction Pad Assembly	848 LBS (384 Kg)
6	Spring Housing	385 LBS (175 Kg)
7	Cylinder	553 LBS (251 Kg)

Item #'s	Description	Approximate Weight
5, 6, 7, 9, 23, 24, 29, 30, 31	Power Head Assembly	1886 LBS (856 Kg)

Description	Approximate Weight
138FHB Assembly	3913 LBS (1775 Kg)

4.2.8 Insert new seals into the grooves, noting the orientation of the seals per Figure 8.

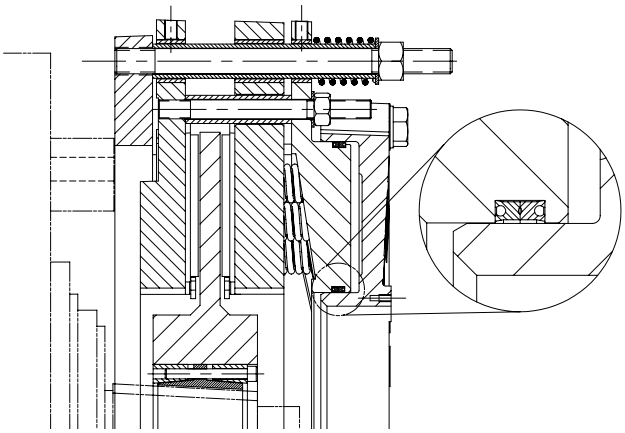


Figure 8

4.2.9 Lubricate the seal surfaces in the cylinder (7) with Molykote M55 grease and carefully slide the cylinder onto the spring housing (6). Take special care to avoid damaging the seal lips.

4.2.10 Place a spacer tube (29) in position over each tapped hole in the pressure plate (5), align the match marks and carefully lower the spring housing and cylinder assembly onto the springs, making sure the springs (23, 24) engage the bosses in the spring housing (6).

4.2.11 Clean the threads on the power head screws (31) and install the power head screws and power head washers (30). Using a crosswise pattern, tighten the power head screws one turn at a time until the spacer tubes are clamped between the cylinder and pressure plate (5).

4.2.12 Remove the power head screws (31) one at a time. Clean and prepare the screw threads and apply Loctite Loc-Quic Primer "T" to the screw threads. Apply Loctite #262 to the screw threads and reinstall the power head screw. Immediately torque the power head screw to the value shown on Table 3.

Note: When removing and reinstalling the power head screws (31), spray the cleaned screw threads with Loctite Loc-Quic Primer "T". Let parts dry and then apply Loctite #262 on the same surface. Install the power head screw and immediately torque as stated in 4.2.12

⚠ **Warning**
Loctite #262 may cure prior to properly tightening the power head screw (31) if not tightened to the proper torque value immediately after installation.

⚠ **Caution**
Loctite #262 must be shaken prior to application. Caution Loctite #262 may irritate sensitive skin. Refer to the product label for safety precautions!

⚠ **Warning**
Use only inspected / certified lifting and rigging equipment to avoid injury and possible death.

4.3 Friction Pad Replacement

⚠ **Warning**
Prior to the removal or installation of the FHB friction pad assembly, make sure that the machinery will remain in secured position. Failure to do so could result in serious personal injury or possibly death.

⚠ **Caution**
Use only genuine, Airflex friction linings. Use of friction lining not of Airflex origin may result in unpredictable brake performance and/or excessive wear of the brake components.

Note: Friction lining (9C) replacement is required when worn to the bottom of the wear groove on the friction lining (See Figure 9) or if oil or grease has contaminated the surface of the friction lining. Airflex FHB brakes are supplied with a detachable friction lining which can be replaced without having to fully dis-assemble the brake. Friction linings should be replaced as a complete set (all linings replaced at one time) to ensure proper brake operation. Friction linings must be replaced when replacing the disc (4).

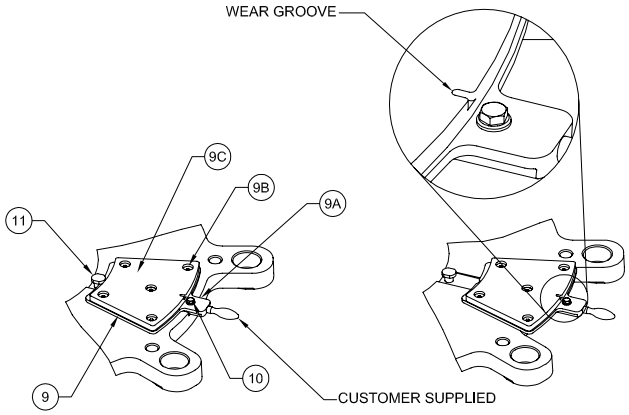


Figure 9

4.3.1 Disconnect the air supply lines and loosen the self locking nuts (17). ONE TURN AT A TIME and in an alternating (crosswise) pattern until a 0.25" (6.4 mm) gap exists between the friction lining (9C) on the floating plate (3) and the disc (4), and the pressure plate (5) and the disc.

Note: If a support stud (14) should happen to come loose, remove it completely and clean the threads on the stud and the threads in the floating plate (3). Apply Loctite Loc-Quic Primer Grade "T" to the threads. After the threads have dried, assemble the shorter length threads of the stud into the floating plate using Loctite #271. The end of the stud must not extend past the surface of the floating plate.

⚠ **Caution**
The self locking nuts (17) must be loosened gradually to prevent damage to the brake components.

⚠ **Caution**
Pinch points exist on the brake during disassembly and assembly.

⚠ **Warning**
Failure to replace all friction linings (9C) as a set may result in damage to the brake and possible brake malfunction, degrading the stopping performance and ability to secure the load.

4.3.2 Assemble a handle or alternate pulling tool (customer supplied) into the tapped hole (M10X1.5) located at the end of the friction pad assembly (9).See Figure (9).

4.3.3 Remove the special flanged screw (10) and slide the friction pad assembly (9) out from the guide groove in the pressure plate (5) and the floating plate (3).

4.3.4 Repeat the steps 4.3.2 and 4.3.3 to remove all of the friction pad assemblies (9).

4.3.5 Inspect the friction linings (9C) for uneven or tapered wear, which may indicate that the disc (4) will require replacement.

4.3.5.1 If only the friction linings (9C) need to be replaced, remove the flat head screws (9B) that secure the friction lining (9C) onto the backing plate (9A). Remove the friction lining from the backing plate and discard the friction lining and flat head screws. Refer to Figure 9.

Note: It may be necessary to use heat to soften the Loctite to ease the removal of the flat head screws (9B). Use a pinpoint torch, heating only the socket area of the flat head screws.

4.3.5.2 Clean and inspect the backing plate (9A). Smooth the backing plate surfaces of any burrs or raised areas with a course flat polishing stone, and clean the tapped holes of any residual Loctite or other contamination.

⚠ **Caution**
Before installing flat head screws (9B), make sure that the screw threads and threaded holes in the backing plate (9A) are clean to ensure that the screws will lock properly.

4.3.5.3 Position the new friction lining (9C) on the mounting surface of the backing plate (9A). Apply Loctite #262 to the threads of the flat head screws (9B), install and torque the screws to 28 ft-lb (38 Nm).

⚠ **Caution**
Loctite #262 must be shaken prior to application.

⚠ **Caution**
Loctite #262 may irritate sensitive skin. Refer to the product label for proper safety precautions.

4.3.6 Clean the guide grooves in the pressure plate (5) and floating plate (3) of any contamination.

4.3.7 Clean the sliding surface of friction pad assembly (9) of any contamination.

4.3.8 Apply Loctite #242 to the threads of the special flanged screw (10).

4.3.9 Slide in the friction pad assembly (9) into the guide groove. Once positioned correctly, install the special flanged screw (10) into the threaded hole on pressure plate (5) or floating plate (3). Tighten to the appropriate torque value. See Table 3.

4.3.10 Repeat steps 4.3.2 to 4.3.9 for all friction pad assemblies (9).

4.3.11 Tighten the self locking nuts (17) ONE TURN AT A TIME and in a crosswise pattern until the spacer tube (15) contacts the spring housing (6). Torque the locknuts to the appropriate value. See Table 3.

⚠ **Caution**
The locknuts (17) must be tightened gradually to prevent damage to the brake components.

4.4 Disc Replacement

⚠ **Warning**
Prior to the removal or installation of the FHB disc, make sure that the machinery will remain in secured position. Failure to do so could result in serious personal injury or possibly death.

⚠ **Caution**
Use only genuine, Airflex friction lining. Use of friction linings not of Airflex origin may result in unpredictable brake performance and/or excessive wear of the brake components.

⚠ **Caution**
Pinch points exist on the brake assembly. Keep away from the assembly when applying or releasing the air pressure to avoid injury.

Note: Friction linings (9C) must be replaced when replacing the disc (4). See the maintenance section 4.3 of the manual.

Note: Approximate weights for the brake, selected assemblies, and selected components are listed in Table 7 for hoisting and rigging purposes.

4.4.1 Remove the FHB assembly per the procedures in section 4.8

4.4.2 Loosen and remove the locknuts (20), washers (19), and release springs (18). Make Note of the locations of the release springs to help with reassembly.

4.4.3 Loosen the self locking nuts (17). ONE TURN AT A TIME and in an alternating (crosswise) pattern until all the spring force has been relieved. Remove the locknuts and washers (16) from the support stud (14).

⚠ **Caution**
The self locking nuts (17) must be loosened gradually to prevent damage to the brake components.

⚠ **Caution**
Pinch points exist on the brake during disassembly and assembly.

4.4.4 Secure and remove the power head assembly (cylinder (7), spring housing (6), and pressure plate (5)) and transport to a clean work area.

⚠ **Warning**
Do not loosen the power head screws (31) when the power head assembly or the spring housing (6) is not secured by the self locking nuts (17).

⚠ **Warning**
Use only inspected / certified lifting and rigging equipment to avoid injury and possible death.

4.4.5 Remove the worn disc (4) and discard.

Note: Check the main studs (12) for looseness. If a stud is found to be loose, remove it completely and clean the threads on the stud and the threads in the mounting flange (2). Apply Loctite Loc-Quic Primer Grade "T" to the threads. After the threads have dried, assemble the studs into the mounting flange. The end of the stud must not extend past the surface of the mounting flange.

4.4.6 Replace the friction linings (9C) or friction pad assemblies (9) per section 4.3.

4.4.7 Clean the surfaces of the new disc (4) and hoist the disc into position. Install the disc, centering it on the friction pad assemblies (9) and remove the lifting devices.

Note: The disc wear area is offset from the center hub area of the disc. Ensure that the disc is correctly oriented when installing the disc. The "Z" offset of the disc is 2.325" (59.05 mm). The "Z" offset must be located closest to the cylinder (7). See Figure 3.

⚠ **Caution**
Incorrect orientation of the disc (4) may cause damage or improper functioning of the brake.

4.4.7 Rig the power head assembly (cylinder (7), spring housing (6), and pressure plate (5) into position, aligning the match marks. Locate the holes in the power head assembly over the main studs (12) and lower the power head assembly until it rests on the disc (4).

4.4.8 Lubricate the support stud threads (14) with 30 wt. oil or anti-seizing compound. Assemble the washers (16) and self locking nuts (17) onto the support studs. Tighten the locknuts ONE TURN AT A TIME and in a crosswise pattern until the spacer tube (15) contacts the spring housing. Torque the locknuts to the appropriate value. See Table 3.

⚠ **Caution**
The locknuts (17) must be tightened gradually to prevent damage to the brake components.

4.4.9 Lubricate the threads on the main stud (12) with 30 wt. oil or anti-seizing compound. Assemble the release springs (18) over the large clamp tubes (13) (in the same equally spaced orientation that they were removed). Install the washers (19) and locknuts (20) onto the main studs. Tighten each locknut until the large clamp tube is reached, compressing the release spring between spring housing (6) and the washer. Torque the locknuts to the appropriate value. See Table 3.

4.5 Release Spring Replacement

⚠ **Warning**
Prior to the removal or installation of the release springs (18), make sure that the machinery will remain in secured position. Failure to do so could result in serious personal injury or possibly death.

4.5.1 Disconnect the air supply lines.

4.5.2 Remove the locknut (20), washer (19), and release spring (18) from the main stud (12).

Note: If a main stud (12) should happen to come loose, remove it completely and clean the threads on the stud and the threads in the mounting flange (2). Apply Loctite Loc-Quic Primer Grade "T" to the threads. After the threads have dried, assemble the studs into the mounting flange. The end of the stud must not extend past the surface of the mounting flange.

4.5.3 Inspect the release spring for cracks, and verify the free height. See Table 6.

Note: If any of the release springs (30) are found to be cracked or out of the tolerance as listed in Table 6, replace all of the springs as a complete set.

4.5.4 Lubricate the threads on the main stud (12) with 30 wt. oil or anti-seizing compound. Assemble the release spring (18) over the large clamp tube (13). Install the washer (19) and locknut (20) onto the main stud. Tighten the locknut until the large clamp tube is reached, compressing the release spring between spring housing (6) and the washer. Torque the locknut to the appropriate value. See Table 3.

4.5.5 Repeat 4.5.2 thru 4.5.4 for the remaining release springs (30) until all release springs have been inspected or replaced.

4.6 Inspection and Replacement of Inner and Outer Springs

⚠ **Warning**
Prior to the removal or installation of the inner and outer springs (23, 24), make sure that the machinery will remain in secured position. Failure to do so could result in serious personal injury or possibly death.

Note: Approximate weights for the brake, selected assemblies, and selected components are listed in Table 7 for hoisting and rigging purposes.

4.6.1 Remove the FHB assembly per the procedures in section 4.8.

4.6.2 Remove the power head screws (31), washers (30) and power head spacers (29) attaching the cylinder (7) to the pressure plate (5).

⚠ **Warning**
Before removing the power head screws (31) make sure that all of the self locking nuts (17) are in place and are tightened to the torque value specified in Table 3. Removing the screws (31) while the self locking nuts (17) are in a loose condition may cause personal injury and/or damage to the brake.

4.6.4 Loosen and remove the locknuts (20), washers (19), and release springs (18). Make Note of the locations of the release springs to help with reassembly.

4.6.5 Loosen the self locking nuts (17). ONE TURN AT A TIME and in an alternating (crosswise) pattern until all the spring force has been relieved. Remove the locknuts and washers (16) from the support stud (14).

⚠ **Caution**
The locknuts (17) must be loosened gradually to prevent damage to the brake components.

⚠ **Caution**
Pinch points exist on the brake during disassembly and assembly.

4.6.6 Carefully lift the cylinder (7) and spring housing (6) off the pressure plate (5) exposing the springs (23, 24) and spring retainers (25) and transport to a clean work area.

⚠ **Warning**
Use only inspected / certified lifting and rigging equipment to avoid injury and possible death.

Note: If a main stud (12) should happen to come loose, remove it completely and clean the threads on the stud and the threads in the mounting flange (2). Apply Loctite Loc-Quic Primer Grade "T" to the threads. After the threads have dried, assemble the studs into the mounting flange. The end of the stud must not extend past the surface of the mounting flange.

4.6.7 Remove the spring retainer plates (25), exposing the springs. Note the position and arrangement of the springs (23, 24) and spring retainer plates (25) prior to removal. See Figure 10.

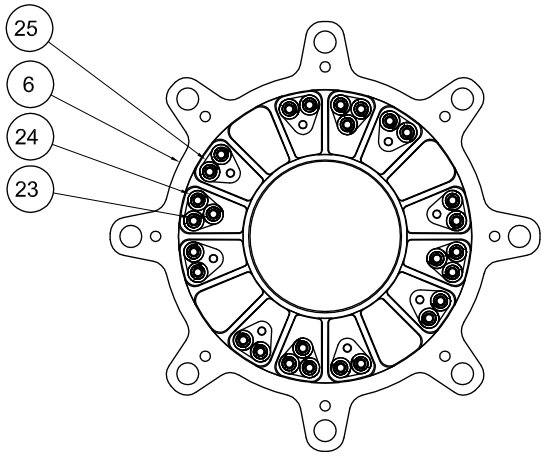


Figure 10

Note: If the cylinder (7) is removed from the spring housing (6) refer to section 4.2 for inspection of the inner and outer seals (21, 22), replacement (if necessary) and reassembly of the cylinder onto the spring housing.

4.6.8 Clean and remove any residual Loctite from the threaded holes in the pressure plate (5) and the threads of the power head screws (31). Check the condition of the threaded holes in the pressure plate and the condition of the power head screws for galling or damage. Repair or replace if necessary.

4.6.9 Inspect the inner and outer springs (23, 24) for cracks, and measure the free height of the springs. See Table 6.

Note: If any of the inner or outer springs (23, 24) are found to be cracked or out of the tolerance as listed in Table 6, replace all of the springs as a complete set.

4.6.10 Install the new springs (23, 24) as a complete set along with the retainer plates (25) in the same pattern that they were originally arranged. See Figure 10.

⚠ **Caution**
No spring retainer plates (25) should cross over the ribs in the spring housing (6).

⚠ **Caution**
Arranging the springs (23, 24) and spring retainer plates (25) incorrectly may result in improper brake functioning.

4.6.11 Rig the cylinder (7) and spring housing (6) assembly over the pressure plate (5). Align the match marks made in 4.8.1, and position the holes in the spring housing over the main (12) and support (14) studs. Carefully lower the spring housing until it rests on the spring retainers (25).

4.6.12 Lubricate the support stud (14) threads with 30 wt. oil or anti-seizing compound. Assemble the washers (16) and self locking nuts (17) onto the support studs. Tighten the locknuts ONE TURN AT A TIME and in a crosswise pattern until the spacer tube (15) contacts the spring housing (6). Torque the self locking nuts to the appropriate value. See Table 3.

⚠ **Caution**
The self locking nuts (17) must be tightened gradually to prevent damage to the brake components.

4.6.13 Place a spacer tube (29) in position over each tapped hole in the pressure plate (5), align the match marks and carefully lower the spring housing (6) and cylinder (7) assembly onto the inner and outer springs (23, 24), making sure the springs engage the bosses in the spring housing.

4.6.14 Clean the threads on the power head screws (31) and install the power head screws and power head washers (30). Using a crosswise pattern, tighten the power head screws one turn at a time until the spacer tubes (15) are clamped between the cylinder (7) and pressure plate (5).

4.6.15 Remove the power head screws (31) one at a time. Clean and prepare the screw threads and apply Loctite Loc-Quic Primer "T" to the screw threads. Apply Loctite #262 to the screw threads and reinstall the power head screw. Immediately torque the hex head screw to the value shown on Table 3.

Note: When removing and reinstalling the power head screws (31), spray the cleaned screw threads with Loctite Loc-Quic Primer "T". Let parts dry and then apply Loctite #262 on the same surface. Install the power head screw and immediately torque as stated in 4.6.15.

⚠ **Warning**
Loctite #262 may cure prior to properly tightening the power head screw (31) if not tightened to the proper torque value immediately after installation.

⚠ **Caution**
Loctite #262 must be shaken prior to application. Caution Loctite #262 may irritate sensitive skin. Refer to the product label for safety precautions!

⚠ **Warning**
Use only inspected / certified lifting and rigging equipment to avoid injury and possible death.

4.6.14 Lubricate the threads on the main stud (12) with 30 wt. oil or anti-seizing compound. Assemble the release springs (18) over the large clamp tubes (13) in the same orientation that they were removed in and install the washers (19) and locknuts (20) onto the studs. Tighten the locknuts until the large clamp tube is reached, compressing the release spring between spring housing (6) and washer. Torque the locknuts to the appropriate value. See Table 3.

4.7 Bushing Replacement

⚠ **Warning**
Prior to the removal or installation of the floating plate, pressure plate, and spring housing bushings (26, 27, 28) make sure that the machinery will remain in secured position. Failure to do so could result in serious personal injury or possibly death.

Note: Approximate weights for the brake, selected assemblies, and selected components are listed in Table 7 for hoisting and rigging purposes.

⚠ **Warning**
Use only inspected / certified lifting and rigging equipment to avoid injury and possible death.

4.7.1 Remove the FHB assembly per the procedures in section 4.8.

4.7.2 Disassemble the brake per section 4.6.2 thru 4.6.9.

⚠ **Warning**
Do not loosen the power head screws (31) when the power head assembly or the spring housing (6) is not secured by the self locking nuts (17).

⚠ **Caution**
Before removing the release springs, make Note of the position that they are in so that the release springs may be re-installed similarly for proper brake functioning.

4.7.3 Remove the pressure plate (5) and transport it to clean work area.

4.7.4 Remove the disc (4) and transport it to clean work area.

4.7.5 Remove the floating (3) plate and transport it to clean work area.

4.7.6 Inspect the floating plate bushings (26), pressure plate bushings (27), and spring housing bushings (28). See Figure 11. Refer to wear limits shown in Table 6 to determine if the bushings require replacement. If any of the bushings are at or beyond the wear limits, all of the bushings must be replaced.

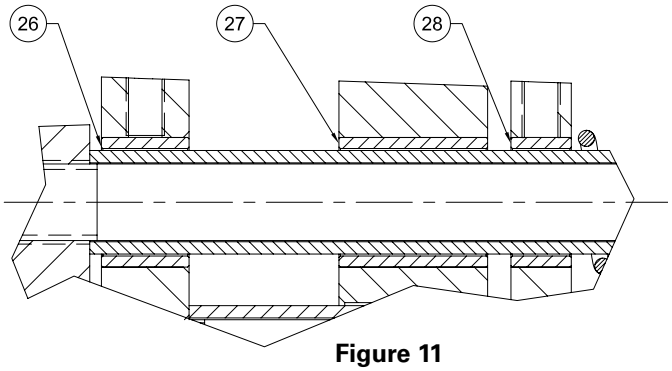
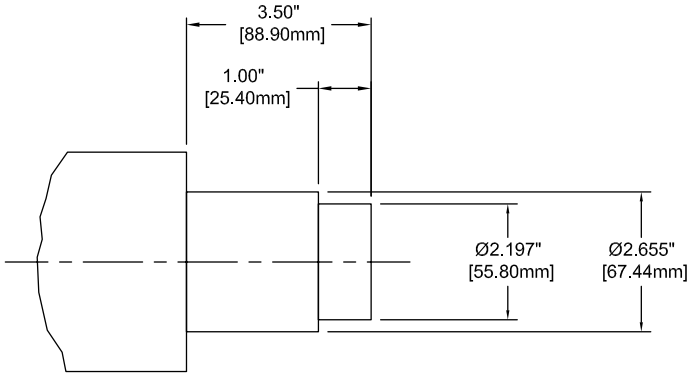


Figure 11

4.7.7 Should the bushings (26, 27, 28) require replacement, fabricate a tool as shown in Figure 12 to remove the bushings.



LENGTH TOLERANCE: ±0.100" [2.54mm]
DIAMETER TOLERANCE: ±0.005" [0.13mm]

Figure 12

4.7.8 To remove each bushing, provide support to the area surrounding the bushing. Insert the tool fabricated in 4.7.7 into the bushing and press or tap out the bushing.

⚠ **Caution**
Failure to properly support the areas surrounding the bushings (26, 27, 28) when removing the bushings may result in damage to the spring housing (6), pressure plate (5), or floating plate (3).

4.7.9 Repeat 4.7.8 until all of the bushings are removed.

4.7.10 After the bushings (26, 27, 28) have been removed, inspect the holes in the spring housing (6), pressure plate (5), or floating plate (3) for any damage. If there are nicks, dings, dents, or burrs, remove the imperfections. Do not exceed the maximum hole size listed in Table 6.

4.7.11 Inspect the new bushings (26, 27, 28) for any irregularities or damage. Remove any imperfections with light sanding or buffing. Clean the bushings of any debris.

4.7.12 Bushings (26, 27, 28) are designed to be a press fit into their mating parts. To make the press fit easier, it is recommended to place the bushings in dry ice or a super chilled freezer, cooling them to -80°F (-62°C) or below.

⚠ **Caution**
Be sure to wear proper personal protective equipment.

4.7.13 Chill bushings (26, 27, 28) in dry ice or a freezer until the bushings can be fitted and assembled into their respective holes. Carefully insert the bushings into their respective holes, ensuring that the bushings are assembled evenly with the face of the component. See figure 11.

4.8 FHB Removal

4.8.1 Match mark the mounting flange (2), floating plate (3), pressure plate (5), spring housing (6), and cylinder (7) for orientation during reassembly.

4.8.2 Apply air to the cylinder (7) to release the brake.

Note: Adequate release pressure should be applied to ensure that the disc (4) is free to move.

⚠ **Warning**
Maximum allowable air pressure is 120 psig (8.2 bar). Application of pressure exceeding maximum allowable may result in damage to the brake.

⚠ **Caution**
Pinch points exist when actuating the brake assembly. Keep away from the assembly when applying or releasing the air pressure to avoid injury.

4.8.3 Rotate the disc (4) to position one of the M12 holes at the top 12 o'clock position.

4.8.4 An M12 eyebolt can now be assembled into the top hole. Suspend the disc by use of a hoist or other certified lifting device.

⚠ **Warning**
Use only inspected / certified lifting and rigging equipment to avoid injury and possible death.

4.8.5 Remove the taper shaft lock (TSL) (8) per the following procedures.

4.8.5.1 Refer to Figure 3. Remove all locking screws (8D) from the TSL. Ensure that the threaded push-off threads are in good condition. Transfer the screws into all of the push off threads in the front clamp collar (8A).

4.8.5.2 Release the front clamp collar (8A) by progressively tightening all push off screws. Typically, the push-off screws appear to be completely tight after just one pass of tightening without any noticeable separation of clamp collars. Although it seems that the screws cannot be tightened further, several more rounds of torqueing in either a clockwise or counterclockwise sequence will increase the push-off force in the system and ultimately release part of the front clamp collar. Afterwards, only the screws which are still tight should be tightened further until complete dismounting is achieved. Remove the front clamp collar (8A).

4.8.5.3 Transfer locking screws (8D) that were used for dismounting of the front clamp collar (8A) into all push-off threads in the center collar (8C). See Figure 3. Release the rear clamp collar (8B) by repeating procedures outlined in above step.

4.8.6 Once the TSL is removed from the disc and motor shaft, exhaust and remove the air supply components. Remove the lifting devices supporting the disc.

4.8.7 Rig the FHB brake with soft slings to properly support the brake assembly.

⚠ **Caution**
DO NOT use the M12 holes in the disc (4) to support or lift the brake assembly.

4.8.8 One at a time, remove the 1-1/2 6NC X 5.00" Grade 8 brake mounting hex head screws, lock washers and shims, and replace each hex head screw with a 12" (305 mm) long 1-1/2-6NC-2 section of threaded rod to assist in the removal of the brake.

4.8.9 Remove the brake assembly from the motor and transport it to a clean, flat, and level work surface with the mounting flange (2) facing down.

5.0 ORDERING INFORMATION/TECHNICAL ASSISTANCE

5.1 EQUIPMENT REFERENCE

5.1.1 In any correspondence regarding Eaton Airflex Equipment, refer to the information on the product nameplate and call or write:

Eaton
Hydraulics Group USA
Airflex Products
9919 Clinton Road
Cleveland, Ohio 44144
Tel.: (216) 281-2211
Fax: (216) 281-3890
www.eaton.com/hydraulics

Parts List
FHB Brakes

6.0 Parts List

Item	Description	138 FHB 146562A Part Number	Qty
1	Adapter Plate	515531	1
2	Mounting Flange	515532	1
3	Floating Plate	515503	1
4	Disc	515536	1
5	Pressure Plate	515505	1
6	Spring Housing	515507	1
7	Cylinder	515509	1
8	Taper shaft lock	417385-02	1
9	Friction Pad Assembly	308589	16
10	Special Flanged Screw	308602	16
11	Shoulder Screw	308593	16
12	Main Stud.	308601-01	8
13	Large Clamp Tube	308586-01	8
14	Support Stud	308592-01	8
15	Spacer	308590-01	8
16	Flat Washer	000067X0063	8
17	Self Locking Nut	000414X0013	8
18	Release Spring	416751-04	4
19	Flat Washer	000067X0065	8
20	Sleeve Nut	000414X0004	8
21	Inner Seal	000402X0005	2
22	Outer Seal	000402X0006	2
23	Inner Spring	416751-08	28
24	Outer Spring	416751-07	28
25	Spring Retainer	415635	14
26	Floating Plate Bushing	204214-01	8
27	Pressure Plate Bushing	204214-02	8
28	Spring Housing Bushing	204214-03	8
29	Power Head Spacer	308599-01	8
30	Power Head Washer	000067X0064	8
31	Power Head Screw	000391X3602	8
50	Shim	000153X1020	36
51	Drain Plug	000077X0021	1

Item	Friction Pad Assembly (9) Components (See Figure 9) Description	Part Number	Qty
9A	Backing Plate	417413	1
9B	Flat Head Screw	000441X00001	5
9C	Friction Lining	308588	1

6.1 138FHB Cylinder Seal Kit

Parts Included in Kit Model	Kit P/N	Seal Lubricant Part No. (qty)	Inner Lip Seal Part No. (qty)	Outer Lip Seal Part No. (qty)	Instruction Sheet Part No. (qty)
138FHB	107662C	000153X1239 (1)	000402x0005 (2)	000402x0006 (2)	204067 (1)

6.2 Friction Block Kit

138FHB Friction Pad Assembly Kit

Parts Included in Kit		138FHB Friction Pad Assembly
Model	Kit P/N	Part No. (qty)
138FHB	108161	308589 (16)

138FHB Friction Lining Kit

Parts Included in Kit		138FHB Friction Lining	Flat Head Screw	Loctite 262 (1.7 oz.)
Model	Kit P/N	Part No. (qty)	Part No. (qty)	Part No. (qty)
138FHB	108162	308588 (16)	000441X0001 (80)	000153X1168 (1)

Eaton
Hydraulics Group USA
Airflex Division
9919 Clinton Road
Cleveland, OH 44144-1077
Tel: 216-281-2211
Fax: 216-281-3890

Eaton
Hydraulics Group Asia Pacific
281 Fa Sai Road
Waigaoqiao Free Trade Zone
Shanghai 200131
China
Tel:(+8621) 5048-4811
Fax: (+8621) 5048-4911

Powering Business Worldwide

Printed in USA
Document No. E-CLCL-II001-E
June 2013