

Airflex DPA Caliper Brake

General information

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) 233-5926
Outside the U.S.A. and Canada: (216) 281-2211
Internet: www.eaton.com/airflex

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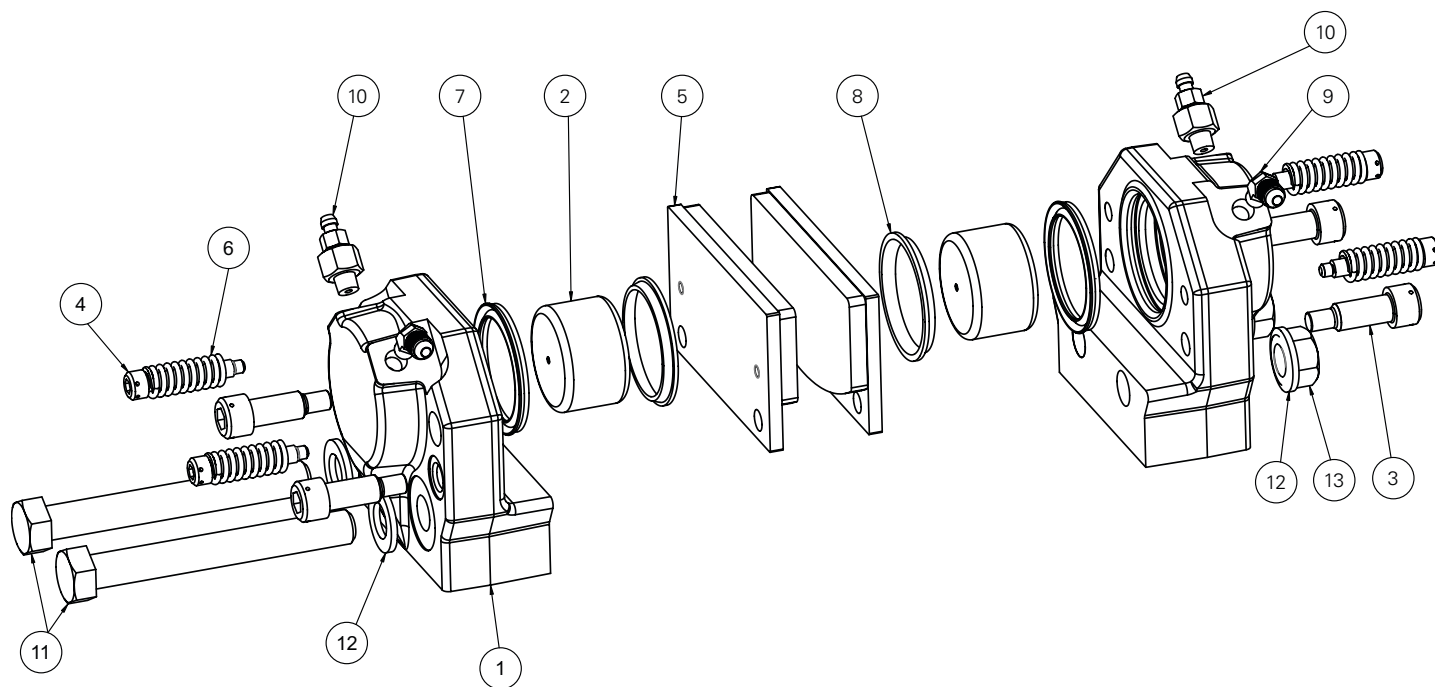



Figure 1

Table 1
Parts description
Basic assembly

Item	Description
1	Cylinder
2	Caliper Piston
3	Caliper Guide Pin
4	Friction Sub Assembly Shoulder Screw
5	Caliper Friction Sub Assembly
6	Return Spring
7	U Seal
8	Rod Wiper
9	45DEG Elbow, 37DEG Flare X 1/8" NPT Male
10	Air Bleeder
11	M16X2.0 X 130 Hex Head Screw
12	Flat Washer
13	M16 X 2.0 Hexagon Nut
14	Name Plate
15	Warning Plate

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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 the 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

Throughout this manual, explanations mentioning specific components of the caliper brakes are often followed by numbers in parentheses, which refer to the item numbers on Figure 1 Friction shoe assembly (5).

- 1.1.1 Eaton Airflex 200DPA caliper brakes are ideally suited for many high torque, high energy stopping applications. By properly choosing actuating pressure, number of calipers per disc, number of discs and disc diameter, a braking system can be custom designed for a wide variety of applications.
- 1.1.2 These models are opposed-piston, direct-acting, disc-style brakes, activated by hydraulic or pneumatic pressure. The braking torque is directly proportional to the applied pressure.
- 1.1.3 The symmetrical split housing construction makes it possible to accommodate brake discs of different thicknesses. Friction shoes attach to the cylinders and are replaceable without disturbing the caliper mounting. Applying pressure to the cylinders piston causes the friction shoes to clamp the disc, developing the braking torque.

- 1.1.4 The brake design includes guide pins, which transmit the tangential braking force from the brake pads to the brake housings. Therefore the brake piston is not subjected to radial force extending brake life.
- 1.1.5 Retracting springs, help retract the brake pads from the disc, while brake pad wear is automatically accommodated by an increase of the piston stroke.
- 1.1.6 These calipers can be air or hydraulic actuated. Seals are compatible for either actuating media. If hydraulic actuation is to be used, use mineral base hydraulic fluid.
- 1.1.7 All Airflex 200DP caliper brakes are supplied with long wearing, NON-ASBESTOS friction material.
- 1.1.8 This manual includes English measurement system values with metric equivalents usually shown in parentheses (XX). Please be sure to use the correct value.

1.2 How it works

- 1.2.1 Air or hydraulic pressure is introduced into both the cylinder blocks (1) via the input fitting (9). Both pistons (2) move simultaneously and squeeze the piston-mounted friction shoe assemblies (FSA) (5) against the disc, causing a braking action. When the actuation pressure is released to '0' psi (bar), the return springs (6) retract the friction shoes from the disc.

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2.0 Installation

2.1 Mounting

- 2.1.1 There are four ½" - 13 X .75 tapped holes in the base of the cylinder block. These are to be used for mounting the brake to a rigid surface. The brake-mounting bracket should be fabricated to butt against the base of the cylinder block. This bracket must also be of sturdy construction and rigidly mounted to prevent deflection during operation.
- 2.1.2 For hydraulic actuation installations, install the brake with the bleeder (10) as high as possible.
- 2.1.3 First install the disc, and then clamp the caliper brake to the disc with either air or hydraulic pressure.

⚠ Caution

Before locating the holes for drilling, make sure the brake friction pads completely engage the disc so they do not overhang the outer edge of the disc. The outside diameter (O.D.) of the disc must not rub against the cylinder block (1).

2.2 Alignment

- 2.2.1 Align the caliper so that the friction pads make full contact with the discs. Partial engagement of the disc will greatly decrease the braking effectiveness of the caliper and cause malfunction. See Figure 2.

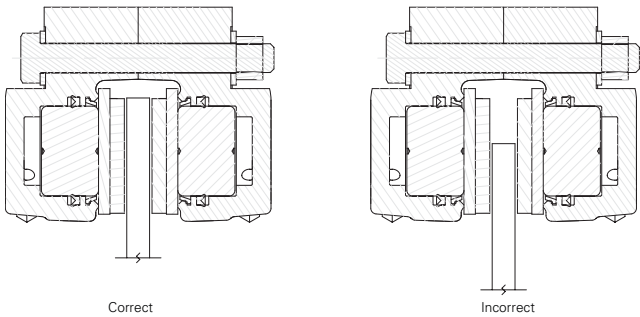


Figure 2

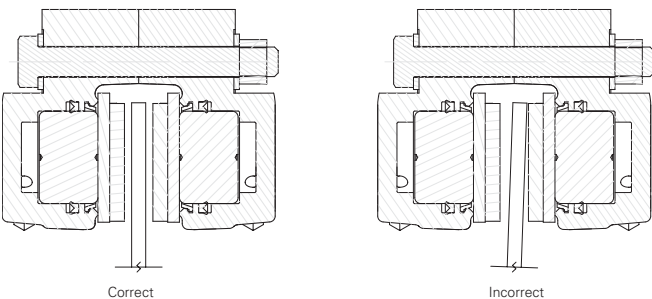


Figure 3

- 2.2.1 It is very important that the mounting bracket be properly aligned with the mounting surface of the brake. When proper alignment is achieved the surface of the disc should be parallel with the adjacent surface of the brake shoe. See Figure 3. For proper operation and service life, alignment of the mounting surface to the shaft of the disc gear should be held within specified tolerance limits.

Angular alignment tolerance:

Angular misalignment between disk and the caliper should not to exceed 0.0005 inches / per inch diameter, at which the readings are taken. For example, readings taken at a diameter of 10 inches, multiplied by .0005" (the allowable offset per inch), equals the total allowable offset .005". Example $10.00"(\text{Diameter}) \times .0005" (\text{Allowable offset per inch}) = .005" (\text{Total allowable offset})$.

- 2.2.2 Before final tightening of the mounting screws, apply the brake, tighten the screws, release the brake and check the alignment again.

2.3 Preparation

The friction discs should be protected from being contaminated by oil, grease, dirt or excessive moisture.

2.3.1 Friction shoe gap

The initial gap between the friction shoes and the disc should approximately 0.053 inches (1.3mm). The maximum gap between friction pads and disc during operation should be 0.28 inches (7.3 mm), this will be seen with fully worn friction shoes. Note that the gap will become larger as the friction material is worn away during operation.

2.4 Actuating medium supply

Actuation medium is supplied to the brake via connections (9) on both cylinder blocks. Connection details are: 37° flare, 1/4" OD tube, 1/8-27 NPT thread. Before assembly, actuation medium supply tubes should be clean and free of any debris.

- 2.4.1 Hydraulic actuation system

⚠ Warning

Maximum allowable actuation pressure is 2000 psi (138 bar). Exceeding the maximum pressure may result in personal injury or damage to the brake components. For hydraulically actuated systems, remove any air from the system by following instructions found in Section 4.2.1 later in this manual.

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3.0 Operation



Warning

Do not overheat the brake pads. Maximum recommended temperature on the brake disc surface is 392° F (200° C).

3.1 Pressure limits



Warning

Maximum allowable operating pressure is 2000 psi (138 bar). Exceeding the maximum allowable pressure may result in personal injury or damage to the brake. Due to the spring force, a minimum pressure of 8 psi (.6 bar) is required to engage new friction shoes. Thirteen psi (.9 bar) is required with worn friction material.

3.2 Discs

Minimum disc diameter is 12 inches (304.8 mm).

3.3 Initial operation

Before putting the brake into operation a short wear-in period is required before generating full rated torque. Use the brake to slow and stop the machine a number of times. The brake shoes are ready for operation when the entire surface of the friction shoe shows signs of contact and discoloration.

4.0 Maintenance

4.1 Periodic inspection

The friction discs should be checked to make sure that they are not contaminated by oil, grease, dirt or excessive moisture. Brake pads should be replaced if the friction material has absorbed oil or grease.



Warning

Contamination of the friction material will significantly reduce the torque capacity of the brake and/or result in erratic torque. Observe the friction shoes with the actuation pressure at zero P_{sig}/ bar. If the brake shoes do not release from the disc, it may indicate the calipers are not releasing.



Caution

Damage to the guide pin (3) and shoulder screw (4) will result if the lining is allowed to wear beyond this point.

4.2 Periodic maintenance

The piston (2) should be inspected when pressure is applied and the brake shoes do not move. If inspection of the piston shows signs of wear or damage it should be replaced.

4.2.1 Bleeding the hydraulic system



Warning

Use appropriate gloves and eye protection equipment.



Caution

Do not work on the brake while the system is pressurized. Pinch points exist when pressurizing the brake and injury may occur.



Caution

Re-tighten the bleeder valve before releasing the applied pressure to avoid drawing air back into the system.

Find the air bleeder connection (10) on each of the cylinder blocks (1). Apply hydraulic pressure of 8PSI standard operating pressure, to the actuation media connection (9); gently loosen the bleed screw, venting the air from the system. During this operation fluid will escape, the amount depends upon the number of times needed to thoroughly vent the air from the system. Retighten bleed screw once the air has been removed from the system. Repeat this procedure on both brake cylinders, and as many times as necessary to remove all the air bubbles from the system.



Caution

Prevent contamination of friction material.



Caution

During the bleeding operation, make sure that an adequate supply of fluid is available to prevent air from entering the system.

4.3 Friction material replacement



Caution

Keep replacement friction material clean and free from oil and grease during storage. Use only genuine Airflex friction material. Use of non-original Airflex material may result in unpredictable performance. The brake does not need to be removed in order to replace friction material. Doing so may require realignment of the brake.

4.3.1 Friction material wear adjustments

There are no wear adjustments necessary with this caliper.

4.3.2 Friction material wear limits

An inspection is required to determine when the friction shoes should be replaced. New friction lining thickness is 0.315 inches, (8 mm), not including the backing material. See table 2 for wear limits

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Table 2

Lining condition

Lining	146505 (Standard) 145605A		146505B	
	in	mm	in	mm
New	0.315	8.00	0.315	8.00
Needs Replaced	0.080	2.00	0.205	5.20
Fully Worn	0.010	0.25	0.010	0.25

4.3.3 Friction shoe removal

4.3.3.1 With the pressure off, remove the guide pins (3). Then remove the shoulder screws (4) and return spring (6). Slide the friction shoe assembly (5) out.

4.3.4 Friction shoe replacement

4.3.4.1 Slide the new friction shoe assembly (5) in. Reinstall the guide pins (3). Place the return spring (6) over the shoulder screw (4) and apply Loctite #222. Reinstall by inserting the screw with the attached spring through the bore in the caliper cylinder (1) and attach to the Friction Shoe Assembly (5). Tighten the screws to the values seen in Table 3.

4.4 Piston seal replacement



Warning

Only qualified maintenance personnel should install piston replacement kits. Faulty workmanship may result in possible personal injury, brake malfunction or damage to the machinery.



Caution

Use only genuine Airflex friction material. Use of non-original Airflex material may result in unpredictable performance.

4.4.1 The caliper brake assembly must be removed from the machinery in order to replace the piston (2), U seal (7) and rod wiper (8). Remove the friction shoe assemblies (5) as explained in section 4.3.3.1.

4.4.2 To remove the old piston (2), depressurize the system. Split the brake by removing the 2 large hex head bolts (11). Once the brake is split, a small amount of line pressure may be needed to remove the piston.



Caution

Do not use excessive pressure if the piston does not slide out. Doing so may result in injury.

Once the piston (2) has been removed, remove and discard the U seal (7) and rod wiper (8). Inspect the cylinder for any corrosion or pitting. If the cylinder

is free of any galling, pitting, corrosion or abrasive particles, clean the cylinder wall using a non-abrasive oil free cleaning agent.



Caution

Keep the U seal and rod wiper grooves free of debris. Coat the new U seal (7) and rod wiper (8) with a compatible oil, and place them carefully into their respective grooves. Also, coat the piston (2) wall with compatible oil. Make sure the seal and rod wiper are installed with the proper orientation. See Figure 4.

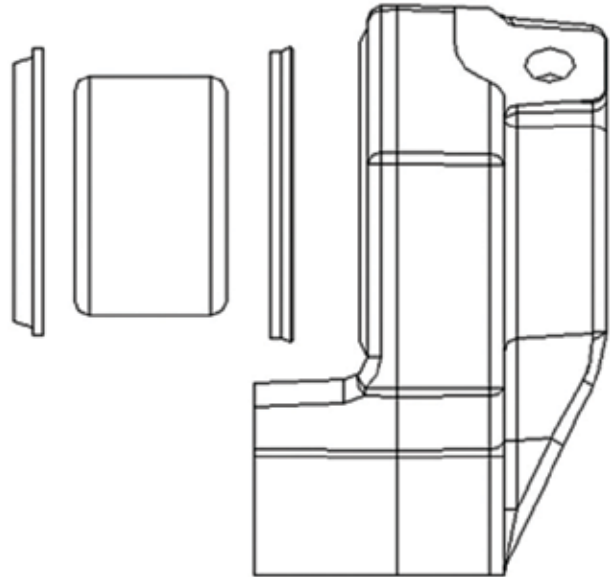


Figure 4



Caution

Do not damage the U seal or rod wiper. Damage to these components may cause leaks.

4.4.5 Carefully place the piston (2) into the cylinder block (1) making sure not to damage the U seal (7) or rod wiper (8). Press the piston into the cylinder block until fully inserted. It may be necessary to loosen the bleed screws (10) on the cylinder block to bleed off the pressure to fully insert the piston.

4.4.6 Slide the new Friction Shoe Assembly in. Reinstall the guide pins and return the compression spring screws as described in section 4.3.4.1. Then tighten the screws to the values in Table 3.

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Table 3

Fastener assembly torques

Fastener	Description		Torque (ft/lbs)	Torque(nm)
3	Caliper Guide Pin	308453	**44	59.4
4	Shoulder Screw	308521	**88	9.94
13	Hex Head ScrewX	(M16 X 2.0) 130 Hex	140 Dry	189

**Assemble with Loctite #222

5.0 Ordering information /Technical assistance

5.1 Equipment reference

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

Eaton
Airflex Division
9919 Clinton Rd.
Cleveland, Ohio 44144

Tel: (216) 281-2211
Fax: (216) 281-3890
Internet: www.airflex.com

Loctite is a registered trademark of Henkel KgaA.

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6.0 Parts (Standard)

Basic assembly

Item	Description	Part number	Standard 200DPA 146505 (Standard)	
				Qty
1	Cylinder	515093		2
2	Caliper Piston	308452		2
3	Caliper Guide Pin	308453		4
4	Friction Sub Assembly Shoulder Screw	308521		4
5	Caliper Friction Sub Assembly	417043		2
6	Return Spring	308520		4
7	U Seal	000153X1277		2
8	Rod Wiper	000153X1272		2
9	45DEG Elbow, 37DEG Flare X 1/8" NPT Male	000153X1276		2
10	Air Bleeder	000153X1274		2
11	M16X2.0 X 130 Hex Head Screw	000391X1608		2
12	Flat Washer	000067X0059		4
13	M16 X 2.0 Hexagon Nut	000414X0011		2
14	Name Plate	308483		1
15	Warning Plate	308484		1

7.0 Rebuild Kit 146505 Only (Contact Eaton for kits related to other assemblies)

Kit P/N	Description	Pin (3)	Friction shoe assembly shoulder screw (4)	Friction shoe assembly (5)	Return spring (6)
146505Y	Part No.	308453	308521	417043	308520
	Quantity	4	4	2	4

7.1 Seat Kit

Model	Kit P/N	Description	U-Seal	Piston wiper ring (8)
200DPA	146505X	Part No.	000153X1277	000153X1272
		Quantity	2	2

Eaton product warranty

Subject to the conditions stated here in, Eaton Corporation warrants to the Purchaser that each new Airflex Product manufactured by Eaton will be free from failures caused by defects in material and workmanship, and will deliver its rated capacity, for a period of twelve (12) months from the date of shipment to Purchaser, provided such Product is properly installed, properly maintained, operated under normal conditions and with competent supervision. Warranty claims shall, be made in writing and the part or parts shall, if requested by Airflex Division, be returned repaid to the Airflex Division for inspection. Upon a determination that a defect exists, Eaton shall thereupon correct any defect, at its option either by repairing any defective part or parts or by making available at Eaton's plant a repaired or replacement part. This warranty does not extend to normal wear parts or components of the Product, such as friction material and friction surfaces.

Limitation of warranty

The foregoing warranty is exclusive and in lieu of all other warranties whether written, oral or implied. Any implied warranty of merchantability or fitness for a particular purpose are specifically excluded. In no event shall Eaton be liable for

In no event shall Eaton be liable for special, incidental or consequential damages. Eaton's liability arising out of the supplying of such Product, or its use, whether in warranty, contract or otherwise, shall in no case exceed the cost of correcting defects in the Products as herein provided. Upon expiration of the twelve (12) month period, all such liability shall terminate. The foregoing shall constitute the sole remedy of purchaser and the sole liability of Eaton.

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