

# CS 8000



## 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.

# Installation, Operation and Maintenance of Airflex<sup>®</sup> CS and CSA Brake Assemblies



## Caution:

### Use Only Genuine Airflex<sup>®</sup> 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: **1-800 AIRFLEX (247-3539)**

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

Internet: **www.airflex.com**

**February, 1985**

(Revised: June, 2001)

**204086**

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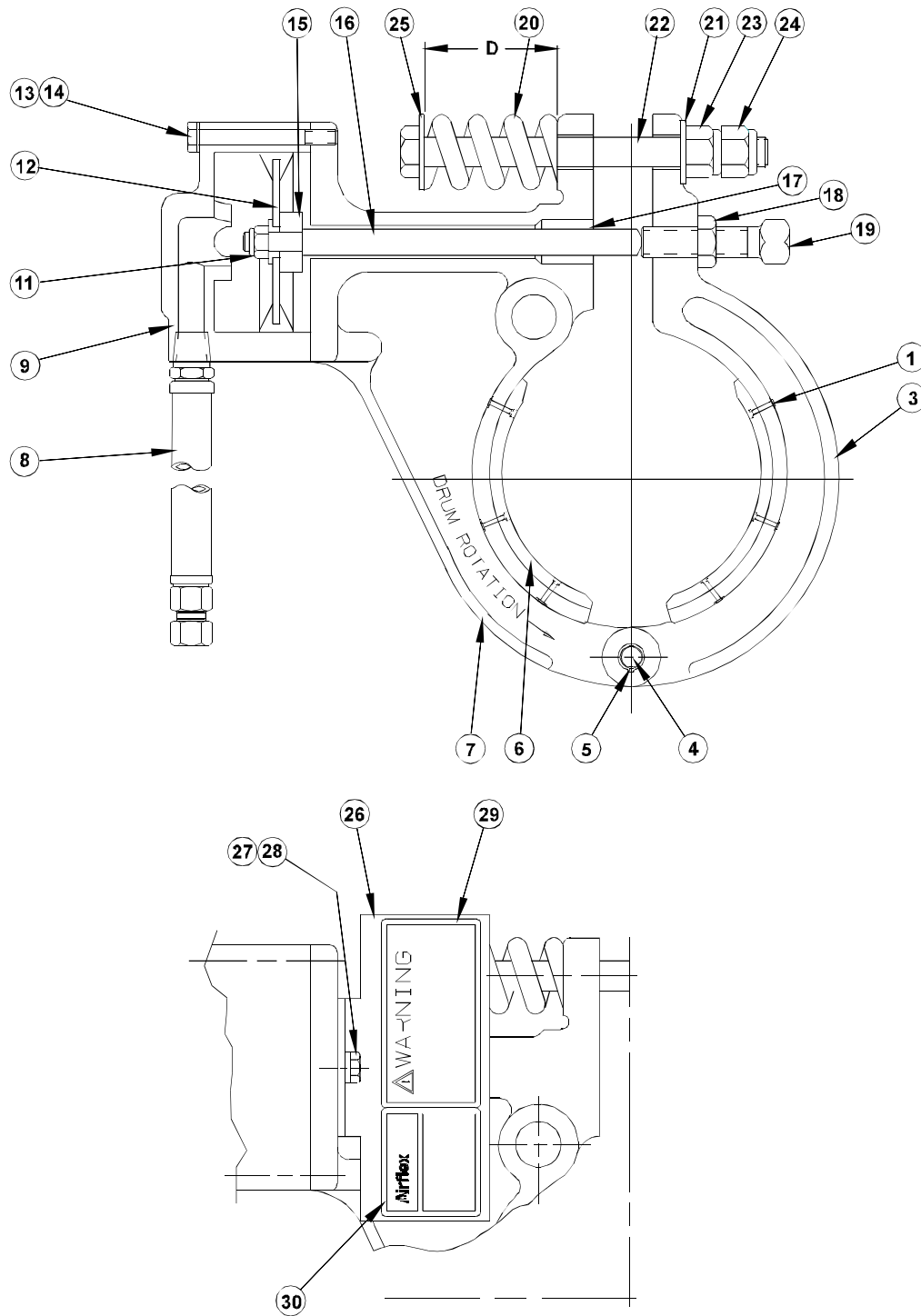
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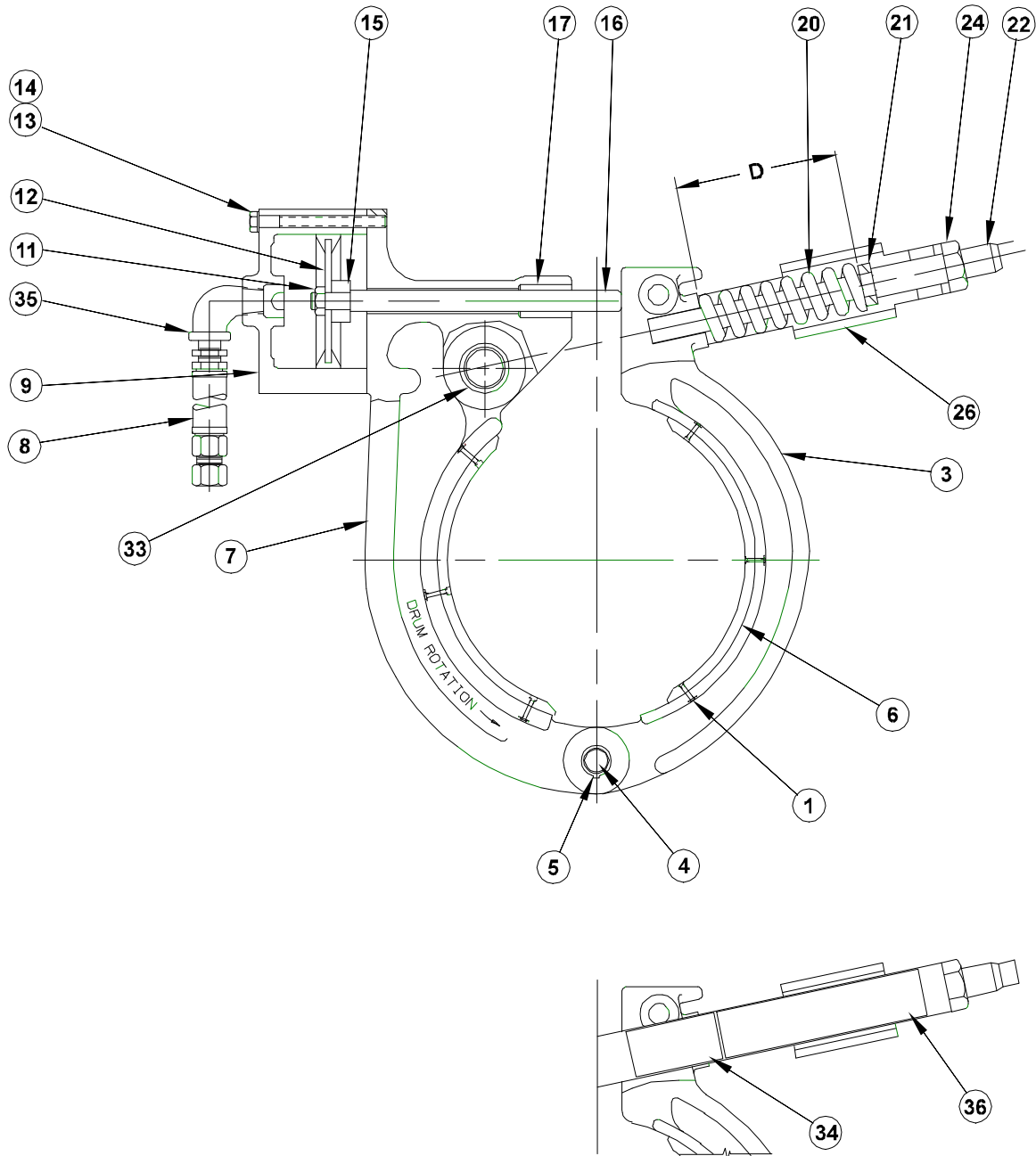
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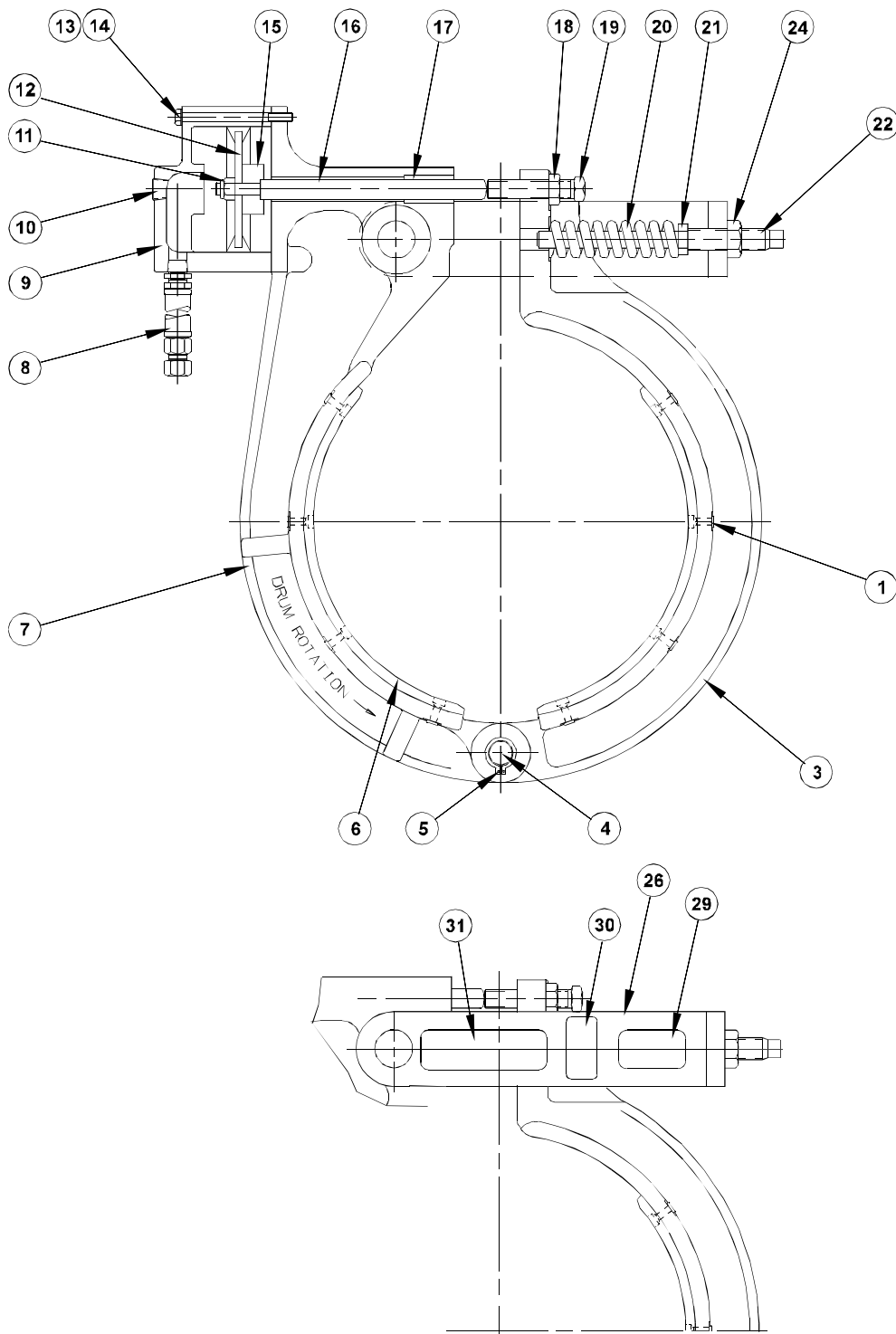
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**Figure 1**  
**Size 4CS150**




**Figure 2**  
**Sizes 6CSA200**  
**9CSA200 & 12CSA200**



**Figure 3**  
**Sizes**  
**15CS300 & 18CS300**

## 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 



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



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



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

- 1.1.1 The Airflex CS and CSA brakes are spring applied and air released. They are to be operated **only** as uni-directional brakes developing substantially less torque in the reverse drum rotation direction than in the required forward direction, as indicated by the arrow on the brake shoe. The brake is designed to be self-energizing so that the spring/shoe configuration assists in the braking action when the brake is mounted with the proper drum rotation.

The brake is recommended for applications requiring a brake that will engage should the operating air pressure fail. The releasing air volume requirement is low, making the brake ideal for high cyclic applications. There are three CS type and three CSA type brake sizes available: 4CS150; 6CSA200; 9CSA200; 12CSA200;

15CS300; 18CS300.

Throughout this manual a number given in ( ) refers to the parts identified in the Figures 1 through 3 and Tables 7 and 8.

### 1.2 How It Works

- 1.2.1 Refer to the brake drawings, Figures 1 through 3. The two brake shoes (3) and (7) are hinged together by a pin (4). When no air pressure is applied to the cylinder (9), the spring (20) applies the force that clamps the brake shoes to the brake drum. The force exerted by the spring and drum rotation determines the torque capability of the brake. The “braking” reaction is against the reaction pin, which is retained in the reaction hole in brake shoe (7). The pin is mounted to a bracket which is fastened to the machine frame. The reaction pin also supports the brake assembly when the brake is not engaged.

When air pressure is applied to the cylinder (9), the piston (12) and rod (16) force the shoe apart to disengage the brake from the drum.

### 1.3 Operating Conditions

The brake should be operated in ambient temperatures within a range from -25 degrees F to 125 degrees F (-32 degrees C to 52 degrees C).

The minimum operating air pressure for the 4CS150 is 75 psig (5.1 bar). The minimum operating air pressure for all other brake sizes is 60 psig (4.1 bar). The maximum operating air pressure for all brake sizes is 110 psig (7.5 bar).

The air supplied to the brake should be clean and dry to avoid contamination of the cylinder and piston. The cylinder and piston are lubricated at the factory so no oil needs to be added. The piston is made using a BUNA-N material, therefore if any additives are used in the air supplied, they must be compatible with the piston material. If in doubt about compatibility, contact Eaton Corporation, Airflex Division.

These brakes are designed to release with a maximum air volume requirement given below:

4CS150	10 in. <sup>3</sup> (0.16dm <sup>3</sup> )
6CSA200	25 in. <sup>3</sup> (0.41dm <sup>3</sup> )
9CSA200	25 in. <sup>3</sup> (0.41dm <sup>3</sup> )
12CSA200	25 in. <sup>3</sup> (0.41dm <sup>3</sup> )
15CS300	40 in. <sup>3</sup> (0.66dm <sup>3</sup> )
18CS300	45 in. <sup>3</sup> (0.74dm <sup>3</sup> )



### **Warning:**

On each brake there are safety and product identification plates or decals. Do not remove or paint over and, if damaged, they must be replaced.

## **2.0 INSTALLATION**



### **Caution:**

Before performing any work, read this manual and study the brake drawings, Figure 1 through 3. Do not risk injury - follow the instructions!

### **2.1 Reaction Pin and Bracket:**

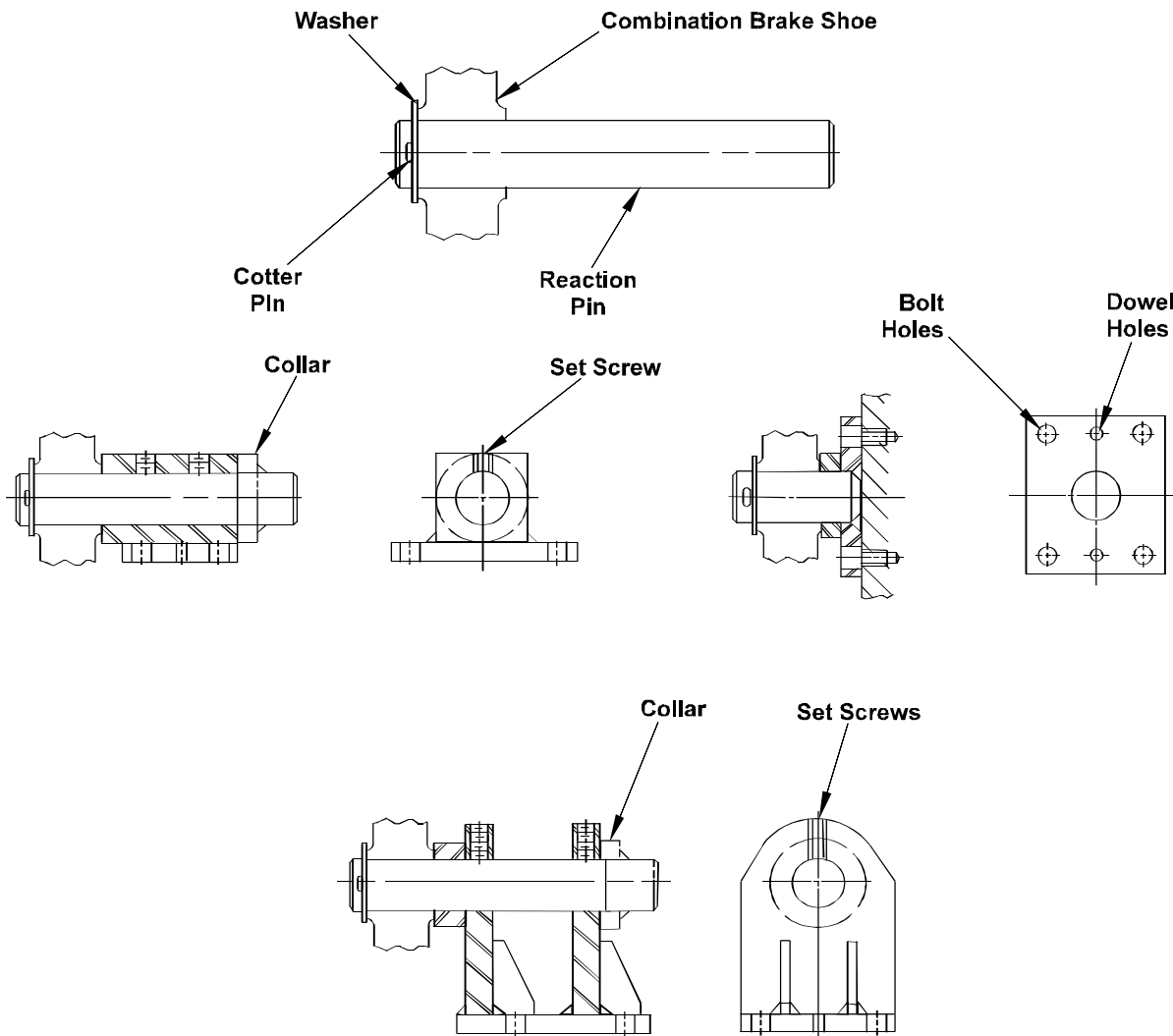
#### **2.1.1 Description and Function:**

- 2.1.1.1 The brake is supported and reacted by a bracket with a steel pin which passes through the brake shoe (7). The brake is held in position on the pin by a washer and a cotter pin, as shown in Figure 4. The bracket, washer and cotter pin are customer supplied. The reaction pin can be supplied by Airflex.

- 2.1.1.2 Design, location and alignment of the reaction pin mounting is extremely important to obtain optimum brake performance.

The reaction pin mounting must be sturdy to support the brake and provide the reaction force for brake operation. Do not insert the reaction pin into a drilled hole in, or weld the pin to, the machine frame as brake alignment would not be possible. The pin should be pressed into a bracket that has oversize mounting holes to allow for adjustment. Refer to Figure 4 for typical brackets for anchoring the reaction pin to the machine frame and alternative methods for holding the pin in the bracket. Refer to Table 1 for reaction pin diameters and hole size for press fits.

Mount the brake as close to the machine frame as possible, to avoid a long unsupported reaction pin and at the same time allow for sufficient clearance to operate the brake correctly.



**Note:**

1. Cut reaction pin to length.
2. Locate and spot drill reaction pin for set screw or weld collar as shown.
3. Drill mounting bolt hole diameters .125" (3-4mm) oversize.  
Minimum number of bolts - 4. Minimum recommended bolt diameters are given below.
4. Drill and dowel bracket in two places after final brake alignment.
5. Tie wire all mounting bolts.

Brake Size	Bolt Dia.	Brake Size	Bolt Dia.
4CS150	.3125" (8mm)	12CSA200	.375" (10mm)
6CSA200	.3125" (8mm)	15CS300	.375" (10mm)
9CSA200	.375" (10mm)	18CS300	.375" (10mm)

**Figure 4- Typical Brake Reaction Brackets**



<b>Brake Size</b>	<b>Reaction Pin Diameter</b>	<b>Reaction Pin Hole Diameter</b>
4CS150	.750/.749" (19.05/19.02mm)	.7475/.7485" (18.99/19.01mm)
6CSA200	1.000/.999" (25.40/25.37mm)	.9975/.9985" (25.34/25.36mm)
9CSA200	1.250/1.249" (31.75/31.72mm)	1.2475/1.2485" (31.69/31.71mm)
12CSA200	1.500/1.499" (38.10/38.07mm)	1.4975/1.4985" (38.04/38.06mm)
15CS300	1.500/1.499" (38.10/38.07mm)	1.4975/1.4985" (38.04/38.06mm)
18CS300	1.500/1.499" (38.10/38.07mm)	1.4975/1.4985" (38.04/38.06mm)

2.1.1.3 The reaction pin **must** be free from nicks and burrs. The pin and mating hole diameters for a press fit for each brake size is given in Table 1.

## 2.1.2 Installation Procedure

2.1.2.1 Slide the reaction pin into the reaction hole in the brake shoe (7) to check for interference. The brake must pivot freely on the pin. Remove the pin for mounting to the bracket.

2.1.2.2 Mount the reaction pin and bracket according to the Table 2 center-distance required from the center of the brake drum to the center of the reaction hole in the brake shoe (7). Mount the brackets leaving the fasteners finger tight so that when the brake is installed it can be aligned. For the CS type brakes, coat the reaction **pin** with a National Lubricating Grease Institute (NLGI) No. 2 molybdenum disulfide grease. For the CSA type brakes, coating of the reaction pin is not required, just ensure that the reaction pin is clean and free of contamination.

<b>Brake Size</b>	<b>Reaction Pin Center to Brake Drum Center Distance</b>
4CS150	2.909/2.922" (73.9/74.2mm)
6CSA200	5.249/5.263" (133.4/133.6mm)
9CSA200	6.660/6.674" (169.2/169.5mm)
12CSA200	8.366/8.380" (212.5/212.8mm)
15CS300	11.997/12.010" (304.8/305.0mm)
18CS300	14.846/14.859" (377.1/377.4mm)

## 2.2 Brake Mounting



### **Warning:**

The CS and CSA type brakes do not develop equal torque in both directions of drum rotation. The rated torque is developed only when the drum is rotating in the forward direction as indicated by an arrow on the combination brake shoe (7). The torque in the reverse direction is substantially less than the forward torque. Determine the direction of drum rotation and mount the reaction pin such that the drum rotation matches the drum rotation arrows on the brake.



### **Warning:**

Prior to performing any work on the Airflex brake, make sure the machinery will remain in a safe position; set and block the machine in a safe position to prevent hazards when the brake is released.



### **Danger:**

Disconnect all electrical power. Failure to comply with the above can result in personal injury or possibly death.

2.2.1 The air cylinder (9) used on the CS & CSA brakes has a vent hole (refer to Figure 2). Mount the brake so that this vent hole faces in a downward direction (as shown in Figure 2) or is otherwise guarded to avoid contaminants from entering the cylinder.

- 2.2.2 For applications where the brake drum is overhung on the end of the shaft, proceed to 2.2.3. For applications where the brake drum is mounted on the shaft that is already installed in place proceed to 2.2.4 .
- 2.2.3 For a shaft end mounted brake drum, apply air pressure (see 1.3) to the brake cylinder (9) through the hose assembly (8) to open the brake. With the air pressure applied and the brake open, slide the brake onto the brake drum and reaction pin. Keep in mind that the drum **MUST** rotate in the direction indicated by the arrow on the brake shoe (7). Install the reaction pin washer and the cotter pin to position the brake. Release the air pressure and proceed to 2.3 for brake alignment.
- 2.2.4 For a brake drum installed on a shaft that is mounted between bearings, the brake can be partially disassembled in order to install it. Proceed as follows:



### **Warning:**

**Do NOT apply air pressure to the release cylinder (9) during brake disassembly. Failure to release the air pressure will result in exposure to hazardous conditions or personal injury.**

- 2.2.4.1 The design of the brake is different for the various sizes. Disassemble as follows:

#### **A. 4CS150 Brake:**

Remove locknut (24) and back off locknut (23) slowly to relieve the spring pressure. Remove locknut (23), washer (21), spring rod (22), spring (20) and washer (25). The brake shoe (3) should now be free to pivot on pin (4) to open the brake. If there is not enough room for the brake shoe to swing, it can be removed by disassembling one snap ring (5) and pin (4).

#### **B. 6CSA200, 9CSA200 and 12CSA200 Brakes:**

Remove locknut (24). The end of the spring rod (22) is square. With a wrench, turn the spring rod CCW to relieve the spring pressure. Remove the spring rod (22), washer (21) and spring (20). The clevis (26) should now be free to swing up and away from the brake shoe (3) with the clevis out of the way the brake shoe should now be free to pivot on pin (4) to open the brake. If there is not enough room for the brake shoe to swing, it can be removed by disassembling one snap ring (5) and pin (4).

#### **C. 15CS300 and 18CS300 Brakes:**

Loosen locknut (24). With a wrench, back out the spring rod (22) CCW to relieve the spring pressure. Remove the spring rod, washer (21), and spring (20). Remove the shipping wire that fastens the clevis (26) to brake shoe (7). Slide the clevis from the brake. The brake shoe should now be free to pivot on pin (4) to open the brake. If there is not enough room for the brake shoe to swing, it can be removed by disassembling one snap ring (5) and pin (4).

- 2.2.4.2 Make sure that there are no burrs or nicks on the reaction pin. If there are, remove them before proceeding. For the CS type brakes coat the reaction pin and the reaction hole in brake shoe (7) with an NLGI No. 2 molybdenum disulfide grease. For the CSA type brakes, coating of the reaction pin and the reaction hole in the brake shoe is not required, just ensure that the pin and the hole areas are clean and free of contaminants.

- 2.2.4.3 For the 4CS150, slide the brake shoe (7) onto the drum and onto the reaction pin. For the 6CSA200, 9CSA200 and 12CSA200 brakes, slide the brake shoe (7) (with the bushings (33) and clevis (26) in place) onto the drum and onto the reaction pin.



### **Caution:**

**The clevis (26) must be installed ON the bushings (33). Failure to have the clevis properly installed may result in hazardous conditions which can cause personal injury or machine damage.**

For the 15CA300 and 18CS300 brakes, slide the clevis (26) over the reaction hole in brake shoe (7), align the holes and slide the assembly onto the drum and onto the reaction pin. The reaction pin goes through both the clevis and the brake shoe.

- 2.2.4.4 If the pin (4) has been removed, remove any burrs or nicks and coat it and the holes in the brake shoes (7) and (3) with an NLGI No. 2 molybdenum disulfide grease.

On brakes 6CSA200, 9CSA200, 12CSA200, 15CS300 and 18CS300, remove any burrs or nicks on the end of the spring rod (22) that is inserted in brake shoe (3) and coat it and the hole with an NLGI No. 2 molybdenum disulfide grease.

- 2.2.4.5 Reassemble the brake by following the disassembly instructions in a reverse sequence from that given in 2.2.4.1.
- 2.2.5 Adjust the brake according to the instructions given in 3.2.
- 2.2.6 Align the brake according to the instructions given in 2.3.
- 2.2.7 If an off-balance mounting as shown in Figure 5 is necessary, the top shoe may ride on the drum when the brake is released. To prevent shoe dragging, the bottom shoe must be supported with an adjustable device similar to that shown in the figure.

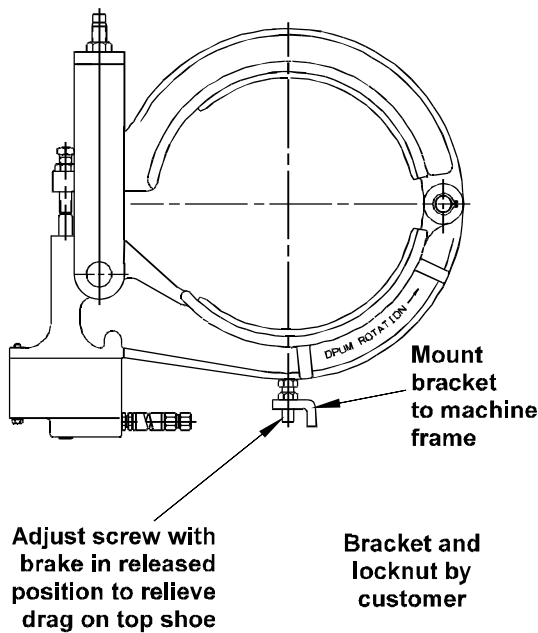


Figure 5 - Typical Off-Balance Brake Mounting

**! Warning:**

The brake shoes must not drag when the brake is released. Dragging may result in rapid friction material wear and heat generation which could result in loss of brake torque.

## 2.3 Brake Alignment

- 2.3.1 With the brake clamped around the drum (no applied air pressure), temporarily secure the reaction pin bracket assembly to the machine frame.
- 2.3.2 Apply and release the air pressure to the brake to open and close the brake shoes. Observe dimensions A, B and C as shown in Figure 6. These dimensions should be identical top to bottom, as well as front to back, with the brake either engaged or released.
- 2.3.3 If the brake has a twisting or cocking motion when it releases or engages, this indicates misalignment and should be corrected by shimming or shifting of the reaction pin bracket for proper alignment of the brake to the drum.
- 2.3.4 After a satisfactory location has been established with proper running clearance assured, anchor the reaction pin bracket by doweling to eliminate any possibility of movement. Safety wire the reaction pin bracket mounting screws.

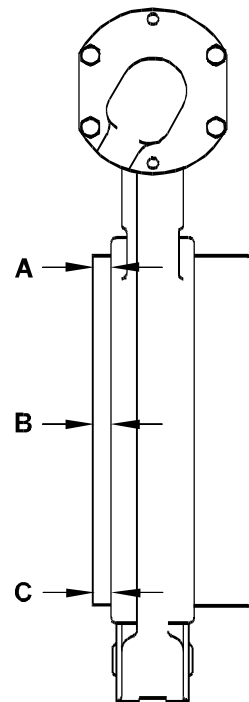


Figure 6 - Brake Alignment

## 2.4 Air Piping

- 2.4.1 Ensure that pneumatic piping is free of foreign material such as pipe thread sealer, metal chips, etc. Pipe ends must be reamed after cutting to prevent reduction of effective pipe diameter. Use 1/4" pipe for the 4CS150 brake and 1/2" pipe for all other sizes. Use minimum length of piping between solenoid air valve and brake. Excessive piping and other restrictions will slow down the response time of the brake. A flexible hose (8) to allow freedom of movement **must** be installed between the brake and a rigid supply line.
- 2.4.2 For dual mounted brake installations, it is important to "tee" the two brake air cylinders, with two equal short lengths of flexible hose, into a single flow control valve and air supply. Utilizing a single flow control valve aids in synchronizing dual brake action during engagement.
- 2.4.3 Refer to 1.3 for operating air pressure requirements.

## 3.0 MAINTENANCE



**Before performing any work, read this manual and study the brake drawings, Figures 1 through 3. Do not risk injury - follow the instructions!**

### 3.1 Inspection:

Periodically or whenever the machinery is shut down for maintenance, inspect the brake, brake drum, supports and air connections for wear, damage or conditions that will affect brake performance. This section contains items to check and action to take during an inspection. Check the parts list, Table 7 and 8, for kits and subassemblies that are available for these brakes.



**Safety and product identification plates or decals are attached to the brake. Do not remove or paint over. Replace any that are damaged.**



**Prior to performing any work on the Airflex brake, make sure the machinery will remain in a safe position, set and block the machine in a safe position to prevent hazards when the brake is released.**



**Disconnect all electrical power. Failure to comply with the above can result in personal injury or possible death.**

#### 3.1.1 Brake Drum Friction Surface:

- 3.1.1.1 If the surface of the drum is badly grooved or worn, the surface may be remachined. However, the drum O.D. **must not** be smaller than that given in Table 3.



**Do not machine the drum diameter below the minimum allowable drum diameter, brake torque can rapidly reduce to zero torque even though the friction lining is only partially worn.**

- 3.1.1.2 Check the drum surface for grease or oil contamination. The surface may be cleaned with a cloth dampened with a solvent.



**Most solvents are flammable and to avoid personal injury or damage to the equipment, use solvents only according to the solvent manufacturer's instructions.**

**Do not allow oil or grease on the drum friction surface or the linings to accumulate or significant reduction in torque capability of the brake may occur.**

**Table 3 - Original and Minimum Drum Diameters**

Brake Size	Original Diameter	Minimum Diameter	Brake Size	Original Diameter	Minimum Diameter
4CS150	4.000" (101.6mm)	3.922" (99.6mm)	12CSA200	12.000" (304.8mm)	11.906" (302.4mm)
6CSA200	6.000" (152.4mm)	5.906" (150.0mm)	15CS300	15.000" (381.0mm)	14.875" (377.8mm)
9CSA200	9.000" (228.6mm)	8.906" (226.2mm)	18CS300	18.000" (457.2mm)	17.875" (454.0mm)

**3.1.2 Friction Linings (6):**

3.1.2.1 Friction linings that have been worn to the minimum allowable thickness as given in Table 4 **must** be replaced (refer to 3.3).



**Caution:**

The friction linings do not normally wear evenly, but must be replaced when the minimum thickness is attained at any point of the working friction material surface. If the lining thickness is below the minimum, the rivet head will score the drum and the friction lining may come loose.

3.1.2.2 If the friction linings are glazed, they may be lightly sanded to remove the glazing **PROVIDING THEY DO NOT CONTAIN ASBESTOS.**



**Warning:**

Older linings (woven type) used on the brake assemblies may have contained asbestos. Current linings are a molded material (non-woven) with a steel metal backing. If the lining is found to not have the steel backing it may contain asbestos. Using appropriate precautions for working with asbestos, remove the linings and dispose of properly. **DO NOT ATTEMPT TO SAND FRICTION MATERIAL CONTAINING ASBESTOS.**



**Warning:**

**When working with any friction material, regardless of whether or not it contains asbestos, always wear approved safety equipment.**

3.1.2.3 If the friction linings have been contaminated by grease or oil, they must be replaced. Refer to 3.3.



**Warning:**

**Do not allow oil or grease to accumulate on the friction lining or drum surface or significant reduction in torque capability of the brake may occur.**

**3.1.3 Assembled Spring and Free Spring Height Checks:**

3.1.3.1 With the brake engaged (no air pressure applied), measure the assembled spring height "D". Refer to Figures 1 through 3 for location of dimension "D". If necessary, adjust per instructions in 3.2.

If the assembled spring height has been adjusted and the brake does not develop proper torque, the spring may have taken a set. For the 4CS150 brake, remove locknut (24) and back off locknut (23) slowly to relieve the spring pressure. For the other brakes, loosen locknut (24) and turn the spring rod (22) CCW to relieve the spring pressure.

Measure the free height of the spring (20). If the free height is less than that given in Table 5, the spring must be replaced. If the free height is **not** less, reassemble the brake and adjust per 3.2.

**Table 4 - Original and Minimum Friction Lining Thickness**

Brake Size	Original Thickness	Minimum Thickness	Brake Size	Original Thickness	Minimum Thickness
4CS150	0.250" (6.4mm)	0.125" (3.2mm)	12CSA200	0.312" (7.9mm)	0.156" (4.0mm)
6CSA200	0.312" (7.9mm)	0.156" (4.0mm)	15CS300	0.375" (9.5mm)	0.188" (4.8mm)
9CSA200	0.312" (7.9mm)	0.156" (4.0mm)	18CS300	0.375" (9.5mm)	0.188" (4.8mm)

<b>Brake Size</b>	<b>Minimum Free Height</b>	<b>Brake Size</b>	<b>Minimum Free Height</b>
4CS150	2.91" (74mm)	12CSA200	5.88" (149mm)
6CSA200	4.89" (124mm)	15CS300	5.88" (149mm)
9CSA200	5.88" (149mm)	18CS300	5.88" (149mm)



**Warning:**

**If the brake spring (20) free height is less than the minimum, proper brake torque will not be developed.**

**3.1.4 Reaction Mounting Pin and Pin (4):**

- 3.1.4.1 Check the movement of the brake on the reaction pin and at pin (4). The brake should move freely at both pins to allow the brake to pivot for full brake wrap-up and lining contact when the brake is engaged.
- 3.1.4.2 If the brake does not pivot freely at both pins, the brake should be removed from the machine (in the reverse sequence from that in which it was installed per 2.0) and the pins and mating bores cleaned. To clean the pin (4) the brake must be partially disassembled. Refer to 2.2.5.
- 3.1.4.3 For the 6CSA200, 9CSA200 and 12CSA200 brakes, check for fit of the brake on the reaction pin. If the brake can be moved in any direction (other than pivoting on the reaction pin) with air pressure applied, 0.030" (0.76mm) or more, the bushings (33) should be replaced. To replace the bushings, remove the brake from the machine in the reverse sequence from that in which it was installed per 2.0 and disassemble per 2.2.4. Refer to 3.5 to remove and install the bushings.
- 3.1.4.4 Before reassembly, for the CS type brakes, coat the reaction pin and mating bore with an NLGI No. 2 molybdenum disulfide grease. For the CSA type brakes, coating of the reaction pin and mating bore is not necessary, just ensure that the pin and bore areas are clean and free of contamination. Further, for all type brakes, before reassembly, coat the pin (4) and mating bore with the same type of grease as above.
- 3.1.4.5 Reassemble the brake and install per 2.0. Adjust the brake per 3.2 and align per 2.3.

**3.1.5 Air System**

Check for leaks and repair.

**3.1.6 Sluggish Disengagement:**

- 3.1.6.1 Poor alignment or a loose mounting bracket may cause sluggish disengagement. Align the brake per 2.3 to correct this condition.
- 3.1.6.2 If spring gap settings are correct but disengagement is sluggish, the power cylinder (9) should be checked. (Refer to 3.4). If the piston (12) is distorted or rod (16) is bent, they should be replaced. If the piston (12) has become sluggish due to contaminated air, the piston should be removed from the cylinder and both piston and cylinder cleaned up and lubricated with Dow Corning 55M or equivalent. Refer to 3.4.
- 3.1.6.3 If the piston leaks air or the air cylinder is scored follow instructions per 3.4.
- 3.1.6.4 Low air pressure will cause sluggish brake release. A minimum air pressure as stated in 1.3 is required for proper operation.
- 3.1.7 If no further work is required on the brake or machine, engage the brake, reconnect the electrical power and remove the safety blocks from the machine.

**3.2 Brake Adjustments:**

As the friction linings (6) and brake drum wear, the brake will require adjustment to maintain rated torque.



**Warning:**

**Do not attempt to increase brake torque with stronger springs or by any other means. Brake failure could result in exposure to personal injury or damage to the machine. Proper brake adjustment and good friction surface conditions will provide optimum torque conditions.**



**Warning:**

Prior to performing any work on the Airflex brake, make sure the machinery will remain in a safe position, set and block the machine in a safe position to prevent hazards when the brake is released.



**Danger:**

Disconnect all electrical power. Failure to comply with the result in personal injury or possibly death.



**Warning:**

Set and block the machine in a safe position to prevent hazards when the brake is released. Disconnect all electrical power.

**3.2.1 Spring Adjustment:**

With the air pressure released from the cylinder and the brake clamped to the drum, loosen the locknut (24) and turn the spring rod (22) until the spring height dimension given in Table 6 is achieved. The location of spring height measurement is shown in Figure 1 through 3. Tighten the locknut (24).



**Warning:**

Do not compress the spring below the specified dimension "D". To do so could produce a high level of stress in the brake components, may cause failure of the brake, and it may make it impossible to release the brake from the drums resulting in possible personal injury.

**3.2.2 Running Gap Clearance Adjustment:**

**3.2.2.1 Brake Sizes 4CS150, 15CS300 and 18CS300:**

Apply operating air pressure (refer to 1.3) to the cylinder (9) . Loosen locknut (18) and back off adjusting screw (19) until the piston (12) bottoms in the cylinder. Then, tighten adjusting screw (19) to obtain a 0.04" to 0.05" (1.02mm to 1.27mm) clearance between each friction shoe and the brake drum. Tighten locknut (18). Proceed to 3.2.3.

**3.2.2.2 Brake Sizes 6CSA200, 9CSA200 and 12CSA200:**

Apply operating air pressure (refer to 1.3) to the cylinder (9). Loosen locknut (24) and adjust spring rod (22) to obtain 0.04" to 0.05" (1.02mm to 1.27mm) clearance gap between each friction lining and the brake drum. Tighten locknut (24). Proceed to 3.2.3.



**Warning:**

Do not overtighten the spring rod adjusting screw. Failure to maintain the clearance gap between the friction linings and brake drum when adjusting can result in brake structural damage, brake failure and possible personal injury.

3.2.3 Apply and release the operating air pressure several times to ensure that the spring height and brake shoe clearances are maintained. Readjust per the above procedure if required. Tighten all locknuts.



**Warning:**

All locknuts must be tightened. Failure to tighten the locknuts will result in loss of brake adjustment and loss of

Table 6 - Assembled Spring Height			
Brake Size	Spring Height "D"	Brake Size	Spring Height "D"
4CS150	2.250" (57.2mm)	12CSA200	5.000" (127.0mm)
6CSA200	4.178" (106.1mm)	15CS300*	5.188" (131.8mm)
9CSA200	4.917" (124.9mm)	18CS300*	5.188" (131.8mm)

\* For the 15CS300 and 18CS300 brakes, use only Airflex supplied springs (item 20, part number 000071 x 0089, Table 7) compressed to the height given. Discard all other springs. The 000071 x 0089 spring can be identified by the following nominal dimensions and description:

- 1) 1.5" O.D. x 0.75 I.D. x 6.00" long (38.1 mmx19.1mmx152.4mm).
- 2) Red original color.
- 3) 15-3/4 total number of coils.

braking torque which could result in personal injury or damage to the machine.

If for any reason the spring retainer (26) has been removed from the 4CS150 brake, it may be reinstalled before proceeding with machine operation. Failure to do so could result in personal injury.

- 3.2.4 If faster brake response is desired, the clearance between the friction shoes and the brake drum can be reduced below the value given in 3.2.1 or 3.2.2. The clearance selected, however, **must** be such that no contact occurs between the rotating drum and the released brake shoes.
- 3.2.5 Engage the brake and remove the safety blocks installed in 3.2. Reconnect the electrical power supply to the machine.
- 3.2.6 If an off- balance mounting is used refer to 2.2.7, the support **must** be adjusted to prevent the linings from dragging on the drum when the brake is engaged.

 **Warning:**

**The brake shoes must not drag when the brake is released. Dragging may result in rapid friction material wear and heat generation which could result in loss of brake torque.**

### 3.3 Friction Lining Replacement:

Refer to the parts list Table 7 for parts that are available for these brakes.

 **Warning:**

Older linings (woven type) used on the brake assemblies may have contained asbestos. Current linings are a molded material (non-woven) with a steel metal backing. If the lining is found to not have the steel backing it may contain asbestos. Using appropriate precautions for working with asbestos, remove the linings and dispose of properly. **DO NOT ATTEMPT TO SAND FRICTION MATERIAL CONTAINING ASBESTOS.**

 **Warning:**

When working with any friction material, regardless of whether or not it contains asbestos, always wear approved safety equipment.

 **Warning:**

Friction linings that are worn below the minimum allowable thickness given in Table 4 or that have been contaminated with oil or grease, **MUST** be replaced, otherwise, the brake torque capability will be reduced and a hazardous condition may result.

- 3.3.1 The brake linings may be replaced in the field.

 **Warning:**

**Use only Airflex supplied friction linings. Friction linings not supplied by Airflex may NOT produce adequate torque or wear and a hazardous condition may result.**

- 3.3.2 Before performing any work on the brake, exhaust and disconnect the air supply to the brake.

 **Warning:**

**Prior to performing any work on the Airflex brake, make sure the machinery will remain in a safe position; set and block the machine in a safe position to prevent hazards when the brake is released.**

 **Danger:**

**Disconnect all electrical power. Failure to comply with the above can result in personal injury or possibly death.**

- 3.3.3 In order to be able to replace the linings, remove the brake from the machine by following in reverse order the installation instructions given in 2.2.



### 3.3.4 Lining Replacement:

To facilitate lining removal, the brake can be partially disassembled by following the instructions given in 2.2.5.1. Drill out the old rivets (19) and remove the linings. Start fastening the new linings at the center and work towards the ends.

3.3.5 Reassemble the brake and install on the machine per the instructions given in 2.2.5.2. through 2.2.5.5. Adjust the brake per 3.2 and align the brake per 2.3.

3.3.6 Connect the air supply and engage the brake. Reconnect the electrical power and remove the machine safety blocks.

### 3.4 Cylinder and/or Piston Replacement:

Refer to the parts lists Table 7 and Table 8 for parts or replacement kits that are available for these brakes.



#### **Warning:**

**Prior to performing any work on the Airflex brake, make sure the machinery will remain in a safe position; set and block the machine in a safe position to prevent hazards when the brake is released.**



#### **Danger:**

**Disconnect all electrical power. Failure to comply with the above can result in personal injury or possibly death.**

3.4.1 Before performing any work on the brake, disconnect the air supply to the brake.

3.4.2 The cylinder (9) and the piston (12) may be replaced with the brake installed on the machine. Disconnect hose assembly (8) from cylinder (9). Remove cap screws (13) and lockwashers (14). The cylinder and piston assembly can now be removed.

3.4.3 Inspect the rubber piston (12). If the seal lip on the pressurized side is worn or damaged, it is possible to turn the piston around on the piston rod (16) to utilize the other unworn side.

3.4.4 Disassemble the piston from the rod by removing locknut (11).

3.4.5 Reassemble using a new piston or turning the old

one round. (Refer to 3.4.3).

3.4.6 Thoroughly clean the inside cylinder diameter. If the inside surface is scored, the cylinder **must** be replaced.

3.4.7 Coat the inside cylinder diameter with Dow Corning 55M grease or equivalent.

3.4.8 Slide the piston assembly into the cylinder and reassemble to the brake shoe (7) using lockwashers (14) and cap screws (13). Connect the hose assembly to the cylinder.

3.4.9 Adjust the brake according to instructions given in **3.2 Brake Adjustment**.

3.4.10 After all adjustments are made, engage the brake, reconnect the electrical power and remove the safety blocks from the machine.

### 3.5 Bushing (33) Replacement



#### **Warning:**

**Prior to performing any work on the Airflex brake, make sure the machinery will remain in a safe position; set and block the machine in a safe position to prevent hazards when the brake is released.**



#### **Danger:**

**Disconnect all electrical power. Failure to comply with the above can result in personal injury or possibly death.**

3.5.1 Bushing (33) is only used on brakes 6CSA200, 9CSA200 and 12CSA200. To replace the bushing, the brake must be removed from the machine. Remove the brake by performing in reverse sequence the instructions given in 2.0.

3.5.2 There are two bushings pressed into the reaction pin bore of brake shoe (7). One bushing protrudes out from the surface of the brake 0.265" (6.7mm) on one side of the brake shoe while the second bushing protrudes 0.265" (6.7mm) from the other side of the brake shoe.

3.5.3 With the brake removed from the machine and the air supply disconnected, carefully loosen the jam nut (24) and turn the spring rod (22) CCW to relieve the spring pressure. Spread the open end of the clevis (26) on each side of brake shoe (7) **just enough** to clear the end of the bushing. Remove the clevis. The spring and spring rod will come off of the brake with the clevis.

 **Caution:**

**Do not spread the open end of the clevis more than the minimum required for disassembly or the clevis may be bent resulting in poor clevis/bushing alignment and degraded brake performance. The clevis thru hole bearing areas must be in full contact with the bronze bushings when properly assembled.**

- 3.5.4 Press out both bushings from the brake shoe. Install the new bushings by first pressing one bushing into the reaction pin hole in the brake shoe until 0.265" (6.7mm) of the bushing protrudes from the surface of the brake shoe. Install the second bushing in the other side of the brake shoe until it also protrudes 0.265" (6.7mm) from the surface of the brake shoe.

 **Warning:**

**Do not operate the brake without the above bushing installed (per 3.5.4) in the brake shoe. Failure to have the bushings properly installed may result in hazardous conditions which can cause personal injury or machine damage.**

- 3.5.5 When installed, one end of the spring rod is contained in a hole in brake shoe (3). Remove any burrs or nicks from this end of the spring rod and coat the end with an NLGI No. 2 molybdenum disulfide grease.
- 3.5.6 Reassemble the brake keeping in mind not to spread the clevis more than **absolutely** necessary to clear the bushings.

 **Caution:**

**Do not spread the open end of the clevis more than the minimum required for disassembly or the clevis may be bent resulting in poor clevis/bushing alignment and degraded brake performance. the clevis thru hole bearing areas must be in full contact with the bronze bushings when properly assembled.**

## 4.0 ORDERING INFORMATION/ TECHNICAL ASSISTANCE

### 4.1 Equipment Reference

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

Eaton Corporation  
Airflex Division  
9919 Clinton Road  
Cleveland, Ohio 44144  
Tel: (216) 281-2211  
Toll Free: (800) AIRFLEX or (800) 824-1586  
Fax: (216) 281-3890

## 5.0 PARTS LISTS

### 5.1 Basic Assemblies

**Table 7 - CS and CSA Brake Component Parts**

Item	Description	Qty.	4CS150	6CSA200	9CSA200	12CSA200	15CSA300	18CS300
1	Rivet	*	(12) 000130X0054	(12)000130X0031	(16)000130X0031	(16)000130X0031	(16)000130X0062	(16)000130X0062
3	Brake Shoe	1	412958	510984	510955	510994	412964	412967
4	Pin	1	201600	201234	201234	200856	201086	201086
5	Snap Ring	2	000139X00024	000139X0009	000139X0009	000139X0014	000139X0014	000139X0014
6	Friction Shoe Assembly	2	415923	415926	415929	415932	415935	415938
7	Combo Brake Shoe	1	412957	510959	510960	510996	510069	510072
8	Hose Assemble	1	000318X0001	000318X0002	000318X0002	000318X0002	000318X0002	000318X0002
9	Cylinder	1	409831	413885	413885	413885	409836	409836
10	Pipe Plug	1	-	-	-	-	000077X0003	000077X0003
11	Locknut	1	000110X0019	000110X0012	000110X0012	000110X0012	000110X0012	000110X0012
12	Piston	1	405835-01	-	405835-02	405835-02	405835-03	405835-03
13	Hex Head Screw	6	000001X0013	405835-02	000001X0219	000001X0219	000001X0220	000001X0220
14	Lockwasher	6	000111X0010	000001X0219	000111X0008	000111X0008	000111X0008	000111X0008
15	Spacer	1	304806	000111X0008	202604	202604	203077-06	203077-05
16	Piston Rod	1	304808	202604	307064-2	307064-3	304809-02	304809-02
17	Bushing	1	202999	307064-01	000147X0252	000147X0252	203128	203128
18	Locknut	1	000061X0001	000147X0252	-	-	000061X0009	000061X0009
19	Adjusting Screw	1	000034X0413	-	-	-	000034X0717	000034X0717
20	Spring	1	000071X0060	-	000071X0089	0000871X0089	000071X0089	000071X0089
21	Washer	1	000067X0005	000071X0103	203934	203934	203934	203934
22	Spring Rod	1	000300X0422	203934	307373-01	307373-01	307373-04	307373-04
23	Locknut	2	000110X0012	307373-02	-	-	-	-
24	Jam Nut	1	-	-	000061X0015	000061X0015	000061X0015	000061X0015
25	Washer	1	000153X0551	000061X0015	-	-	-	-
26	Clevis	1	306387	-	413955-02	413955-03	404685	404685
27	Hex Head Screw	1	000001X0003	413955-01	-	-	-	-
28	Ext Tooth Washer	1	000111X0010	-	-	-	-	-
29	Warning Plate	1	203627	-	-	-	203627	203627
30	Name Plate	1	307595	-	-	-	307595	307595
31	Speed Warning Label	1	-	-	-	-	308044	308044
33	Bushing	2	-	000147X0254	000147X0253	000147X0251	-	-
34	Decal	2	-	203627	203627	203627	-	-
35	Street Elbow	1	-	000079X0012	000079X0001	000079X0012	-	-
36	Speed Warning Label	1	-	308044	308044	308044	-	-

## 5.2 Replacement Kits.

Table 2 - Replacement Parts Kits and Sub-Assemblies								
Part Numbers								
	Description	Qty.	4CS150	6CSA200	9CSA200	12CSA200	15CS300	18CS300
1	Piston Kit	1	105856B	105858M	105859M	105860M	105870B	105872B
2	Cylinder Kit	1	105856A	105858L	105859L	105860L	105872A	105872A

1 — Contains Items: 11, 12, 15, 16

2 — Contains Items: 9, 11, 12, 13, 14, 15, 16



### **EATON PRODUCT WARRANTY**

Subject to the conditions stated herein, 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 prepaid 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.

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