ENGINEERING
TOMORROW

Operating Guide

Airflex® Product Line

Failsafe Caliper Brake Size-3

DOC00103294



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 Danfoss 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 Airflex warranty.

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Parts description

Basic assembly

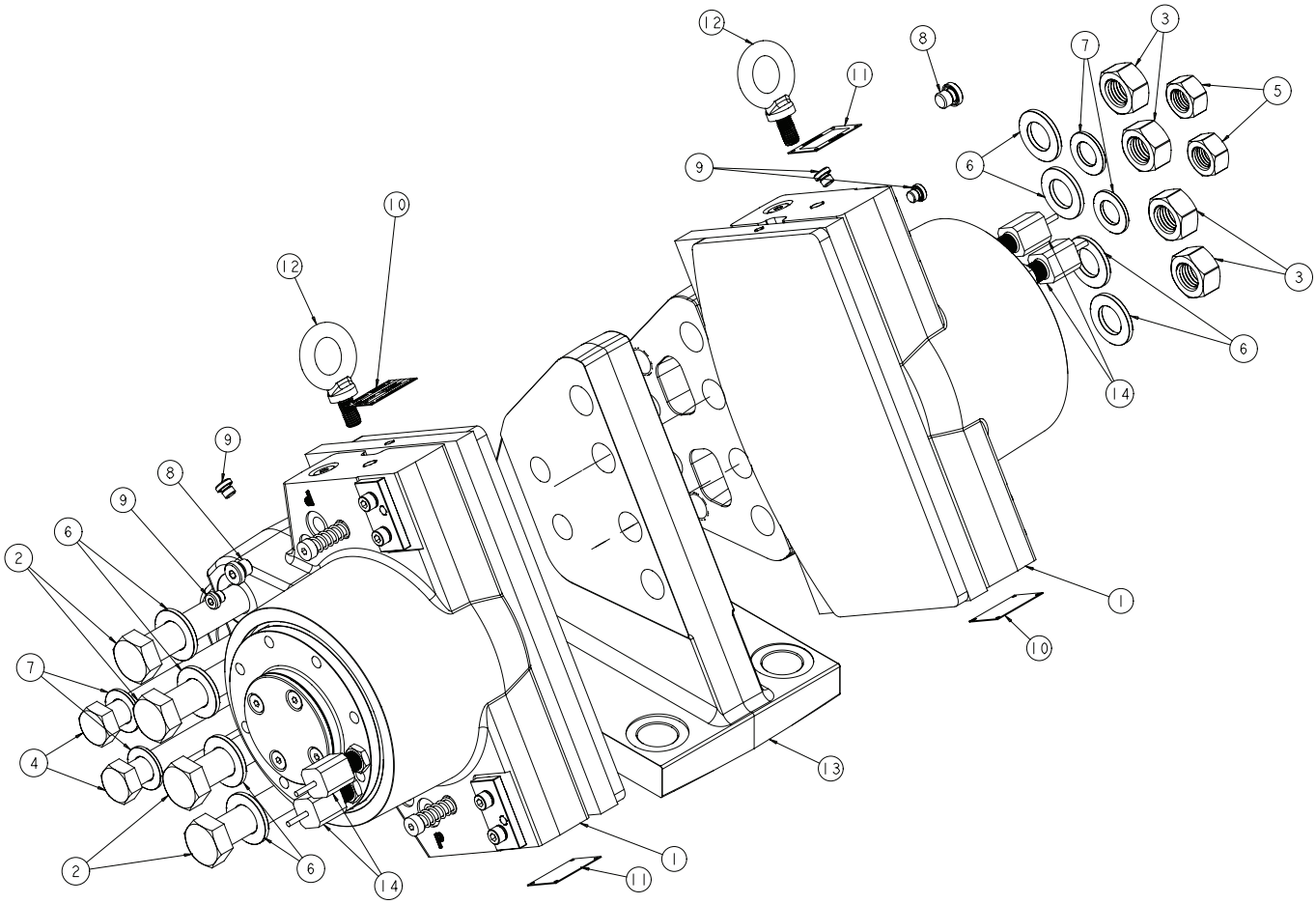


Figure 1

Table 1

Item	Description	Item	Description
1	Brake Sub Assembly	8	1/4" BSPP Plug
2	M24 Mounting Bolt*	9	1/8" BSPP Plug
3	M24 Mounting Nut*	10	Name Plate
4	M20 Mounting Bolt*	11	Warning Plate
5	M20 Mounting Nut*	12	Eyebolt
6	M24 Washers*	13	Bracket*
7	M20 Washers*	14	Sensor*

*Mounting bolts, sensors and bracket are optional

Parts description

Basic assembly

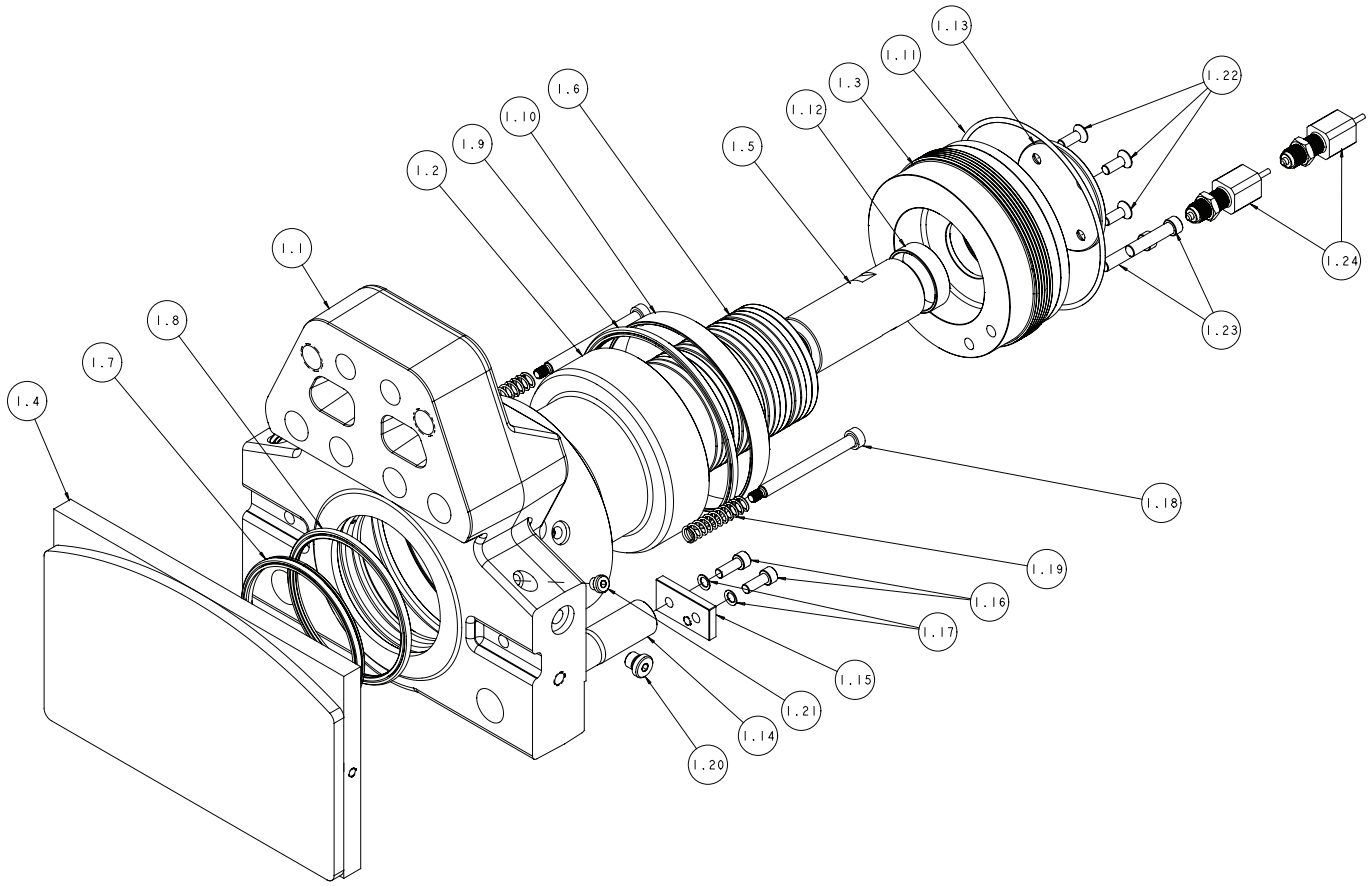


Figure 2

Table 2

Item	Description	Item	Description
1.1	Body	1.13	Top Cover
1.2	Piston	1.14	Shear Pin
1.3	End Cap	1.15	Keeper Plate
1.4	Friction Sub-Assembly	1.16	M8 Bolt
1.5	Center Rod	1.17	Lock Washer
1.6	Disc Spring Kit	1.18	Shoulder Bolt
1.7	Wiper Seal	1.19	Return Spring
1.8	Rod Seal 1	1.20	1/4" BSPP Plug
1.9	Rod Seal 2	1.21	1/8" BSPP Plug
1.10	Bearing Ring 1	1.22	M8 Flat Head Screw
1.11	O-Ring	1.23	Sensor Pin*
1.12	Bearing Ring 2	1.24	Sensor*

*Sensors are optional

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 Safety

This is a failsafe caliper brake assembly (spring applied and hydraulically released) Primarily used to stop equipment/machinery loads in an emergency and additionally for static holding functionality.

Note:

- Always use genuine Airflex spare parts only.
- It is the customer's responsibility to maintain the brake and keep hydraulic systems clean and free from contamination.
- Gap between brake pad and the disc should be closely monitored and not exceed the recommended amount for proper torque.

Brakes:

- Brakes must be bled before use.
- The maximum oil pressure is 230bar.
- Do not use contaminated brake pads.
- Brake disc must also be free of contamination.

Personal safety:

Before using the brake:

- This manual must be read and understood.
- Brake disc and equipment should be locked and must not rotate during installation or maintenance.
- There must be no pressure in hydraulic unit or circuit.
- Pressure from any accumulator(s) should be released or removed.
- Control signal and electric power should be shut off.
- Use proper lifting tools and equipment to handle brake(s)
- Never place fingers in between brake pad and disc.
- Position endcap (1.3) before applying hydraulic pressure to brake.

Disclaimer

This document is updated on a regular basis and may be revised without notification. Always obtain the latest copy from the Danfoss website. In no event can Danfoss be liable for any damages including, but not limited to: damage to other property or person, damage to this product or any associated equipment, lost downtime, profits or revenue.

Description

1.1.1. The Airflex failsafe caliper is a spring applied, hydraulically released brake. The Airflex brake is ideal for emergency stopping or static holding. Loads can be stopped quickly or in a controlled manner and held safely. Variable spring force kits, friction options and disc sizes allow for custom adaptation to any application. Sensors are available for monitoring pad wear and on/off brake status.

1.1.2. Airflex failsafe calipers use non-asbestos friction material.

1.1.3. The caliper brake has two opposing assemblies mounted on single mounting bracket. Changing thickness of mounting bracket or by adding shims, the brake can be used with discs of different thicknesses. Friction can be replaced without removing the caliper.

1.1.4. Minimum operating pressure varies from 40 bar to 190 bar. If installation is not equipped with a high-pressure power source, a pressure intensifier can be used to provide the required pressure.

1.1.5. Brake discs can be supplied or manufactured by the end user. A number of discs are available from Airflex

1.1.6. Each caliper will have a nameplate that contains the model number and the manufacturing date.

1.2 How it works

1.2.1. The Airflex failsafe caliper brake is mounted to a rigid frame and uses springs to apply force to disc. The resultant torque decelerates equipment safely in an emergency or if all power is lost. Controlled and repeated braking is also possible using the failsafe caliper brake. Hydraulic pressure is used to release the brake and allow equipment to function normally

1.2.2. A variety of spring forces, disc sizes, friction and quantity of brakes are available for any industrial equipment needs.

1.3. Hydraulic port connections

1.3.1. Hydraulic connections can be made using hard piping or flexible hoses depending on application needs, with hard piping being preferred.

1.3.2. Airflex caliper brake has four pressure ports (1/4" BSPP) and six drain connections (1/8" BSPP) on each caliper half. See figure 3.

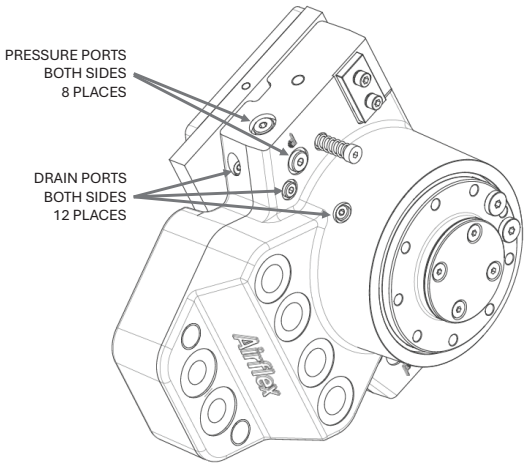


Figure 3

Pressure ports

1.3.3. The pressure ports are used for either pressure connection or for bleeding connection. The connection at the lowest position should always be used as a pressure connection and the upper or highest port should be used for bleeding.

Note- There are two on each side, cross drilled. Any unused port must be plugged.

Drain ports

1.3.4. Drain ports are used to catch normal leakage. Lower ports can be used to control leakage and prevent contamination of the friction material or the disc. Top drain ports should be plugged or vented.

1.3.5. Recommended piping connections are as shown below.

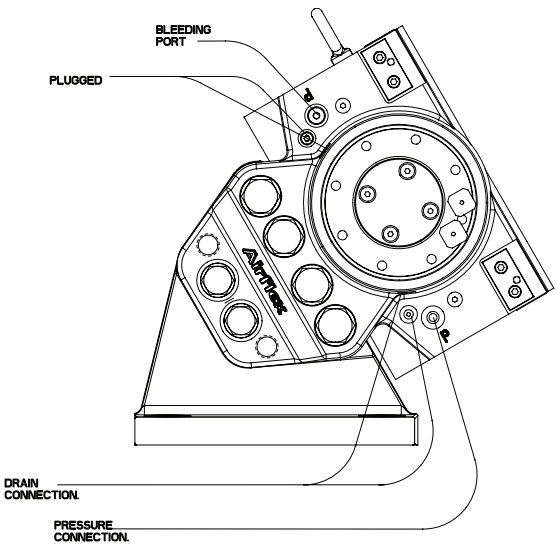


Figure 4

Multiple brakes

While using multiple brakes on a single disc, it is recommended to connect them in parallel to each other. Using a common supply pressure line that branches off to each caliper half. This will ensure that all brakes operate simultaneously.

If required, brakes can be connected in series, but it is not recommended.

NOTE

If using a series circuit, each subsequent brake will operate with a slight delay than the brake before it and is not optimal

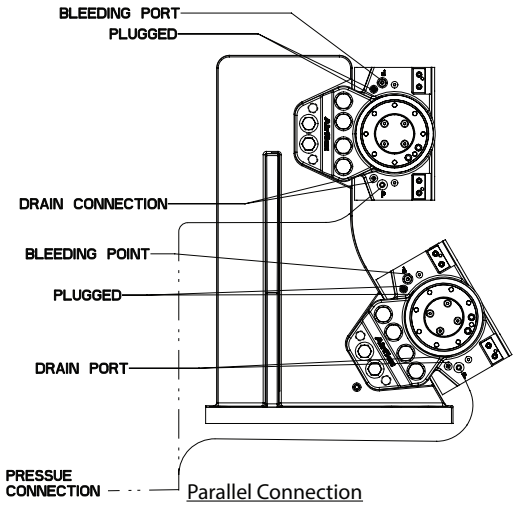


Figure 5

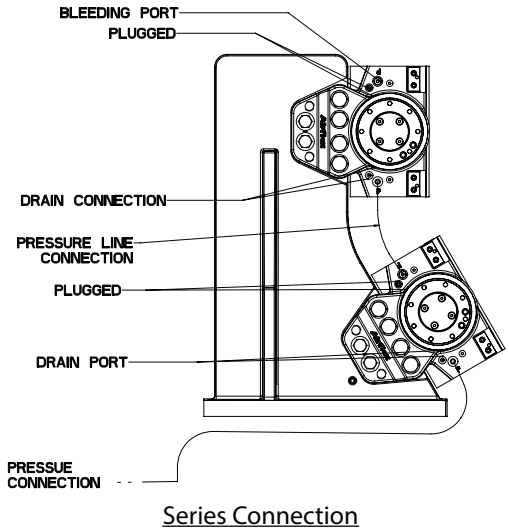


Figure 6

Drain connection

NOTE

It is recommended to use drain connections with tubing routed to a bottle. This will prevent any oil contamination of friction pads and disc.

A transparent plastic pipe/hose should be connected from drain ports to a drain bottle. Connect to the lower ports and install a plug or breather into upper ports. Connect to both sides of each caliper.

2.0 Installation

Each caliper subassembly has an M12 threaded hole on each side to be used for lifting with an eyebolt. Total caliper weight is approximately 150Kg (excluding mounting bracket and mounting bolts). Each subassembly half can be installed separately.

⚠ Warning

Prior to installation, the machinery must be locked in a secure position. failure to do so could result in a serious personal injury or possibly death.

2.1 Preparation

Before installation, the disc must be cleaned, removing any oil, dirt or anticorrosive protection.

2.1.1 Mounting surface between mounting bracket and caliper should be clean and dry. No lubrication should be applied between caliper and mounting surface.

2.1.2 Friction pads should be protected from contamination by oil, grease, dirt or excessive moisture.

⚠ Warning

Contamination of the friction material could result in the loss of significant brake torque.

2.1.3 Several friction options are available depending on the needs in the application. Two main types are organic/composite and sintered metal. Each has its advantages, but organic friction is more sensitive to oil or grease contamination and must not be contaminated.

2.1.4 Set aside friction pads, pins and mounting hardware. See figure 2 - 1.4, 1.14, 1.15,1.16, 1.17

2.2 Mounting of caliper brake assembly

Note- Prior to installation, alignment of the disc and mounting surface to the disc is critical for performance and proper function. Refer to mounting specifications in appendix B throughout this section and prior to brake installation.

2.2.1 Brake disc should be installed prior to mounting the brake assembly. The Maximum runout of disc surface should be less than 0.3 mm (axially, with respect to brake mounting surface).

2.2.2 Center the disc to the mounting surface or bracket within 0.3 mm

2.2.3 Mounting bracket or surface must be properly aligned as per mounting drawing given in Appendix B

2.2.4 Do not fully tighten bracket mounting bolts, as adjustment may be needed during assembly.

2.2.5 Lift one caliper subassembly half with an eyebolt in a lifting hole and align all mounting holes. If shims are used, be sure to place them under the caliper mounting surface.

NOTE

If using mounting shims, equal thickness should be used on each side of bracket.

2.2.6 Insert mounting bolts through one caliper half, mounting bracket and any shims used.

2.2.7 Lift the other caliper half and align it on the opposite side. Slide over the mounting bolts.

2.2.8 Pre-tighten mounting bolts slightly. Before fully tightening, check the gap between brake, mounting bracket and disc.

2.2.9 Tighten the mounting bolts. Refer to Appendix B for mounting bolt torque.

2.3 Hydraulic bleeding

Prior to use, brakes must be properly bled to remove air from the system.

2.3.1 Brakes must be bled any time the hydraulic system is opened or after assembly or repair.

2.3.2 Connect bleed fitting to the uppermost pressure port of each brake side and pressure supply line to either of the two lower ports. Refer back to section 1.3

2.3.3 Slowly fill the system until oil comes out of the bleed fitting without air bubbles and then close the fitting. Take steps to contain the oil with a hose.

2.4 Gap adjustment, piston lock

2.4.1 If not completed, make hydraulic connections and bleed the circuit.

2.4.2 Remove top covers (1.13) from endcaps (1.3)

2.4.3 Check that the endcap is approximately 10mm from the top face of the caliper body (see figure 7, groove in the endcap marks the 10mm distance)

⚠ Warning

Maximum endcap distance is 13mm for pressurizing. Standard is 10mm. See figure 7

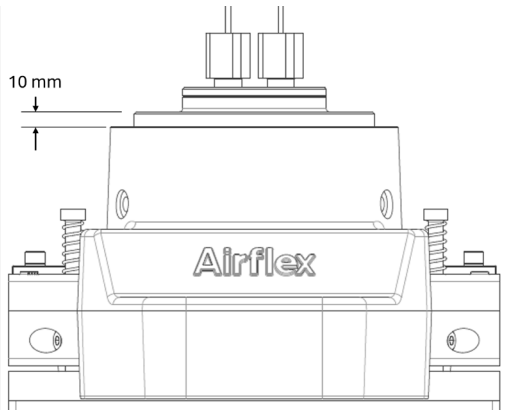


Figure 7

2.4.4 Double check all 4 pressure ports on each side are plumbed or plugged. Apply operating pressure for appropriate size brake according to appendix C

2.4.5 *Lightly hand tighten the wear adjustment bolt into the center rod through the endcap center hole. See figure 8, DO NOT USE A WASHER.

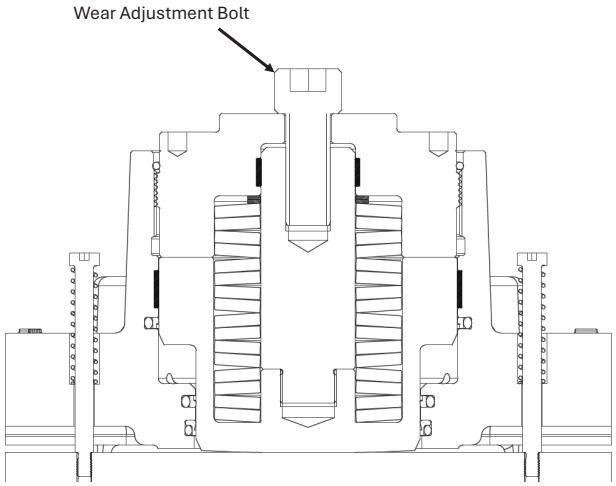


Figure 8

2.4.6 Release the pressure

2.4.7 This will connect the piston to the endcap and allow for adjustment between the pads and the disc. It will also allow for space to insert the friction pads. After the pressure is released, the endcap/piston can be adjusted with a spanner wrench. If using sensors, this condition is also used to install them.

2.5 Sensor installation

2.5.1 If using monitoring sensors, begin by removing the plugs in the two threaded sensor holes in the endcap (1.3). Reference datasheet in appendix D. Friction pad may need to be removed to check piston movement during sensor set up.

2.5.2 Place a sensor pin (1.23) in each of the holes, place the head up so that the sensor will contact it

2.5.3 Thread each sensor into each of the holes

2.5.4 With the piston retracted and wear adjustment bolt in place, thread the sensor used for on/off in until the chosen signal (NC/NO) is made. Temporarily lock it with the locknut

2.5.5 Thread the other sensor 1mm deeper than the first and temporarily lock it with the locknut

2.5.6 Pressurize and unscrew the wear adjusting bolt a few turns. Put an indicator on the screw to measure the piston movement.

2.5.7 Slowly release the pressure and check each sensor activation at 1- and 2-mm travel. Set sensor depth so that the first sensor is made/activated at minimal movement and the other is made at 2mm (friction worn condition) Tighten the locknuts.

2.6 Brake pad installation

2.6.1 Be sure to set the correct gap between the friction surface and the disc face in the following section 3.0 after pads have been installed. There is 10mm of available wear for each pad, after this amount, replace the pads as a set.

2.6.2 Remove or pull back both shear pins (1.14) with their keeper plate (1.15) by removing the outer M8 bolt (1.16). Each keeper plate can remain bolted to each pin.

2.6.3 Slide one friction pad assembly into position between the piston and the disc face. The side M8 holes can be used to suspend or help support the weight. Install shear pins (1.14) to support, then keeper plates and bolts. Torque M8 bolts to 41 NM

2.6.4 Assemble shoulder bolts (1.18) and return springs (1.19) through the two counterbores in the body and into the friction backing plate. Torque to 28 NM

2.6.5 Refer to table 3 for bolt torque

Fastener	Tightening torque
M8 Bolt (1.16)	41NM (30 FT-LBS)
Shoulder Bolt (1.18)	28NM (21 FT-LBS)

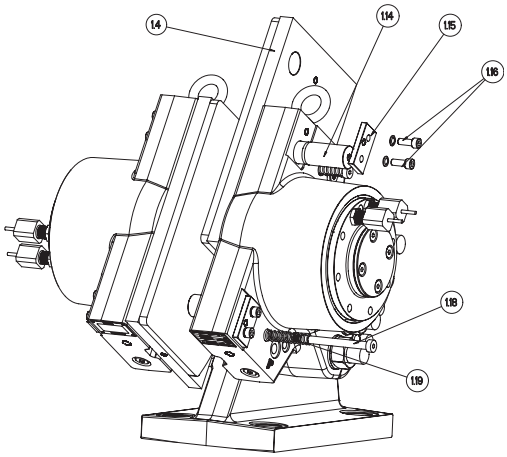


Figure 9

3.0 Operation

⚠ Warning

Ensure adequate safety guarding is installed prior to operation.

⚠ Warning

Friction material must be worn-in to achieve rated brake torque. For new installations or after replacing pads, a minimum wear-in period is required.

⚠ Warning

Protective means must be used to prevent oil, grease, dirt or coolant from coming in contact with the friction material surface. Contamination will significantly reduce torque capacity of brake

⚠ Warning

Maximum pressure is 23 MPa

Air Gap is the distance between brake pad and disc in brake released condition when pressurized. This gap should be maintained as often as feasible to get required brake force and torque. Adjustment is required due to pad wear or after pad replacement.

3.1 Alignment and air gap

Air Gap is the distance between brake pad and disc in brake released condition when pressurized. This gap should be maintained as often as feasible to get required brake force and torque. Adjustment is required due to pad wear or after pad replacement.

3.1.1 Check alignment between brake mounting surface and disc. Repeat section 2.2 if needed. Refer to Appendix-B

3.1.2 Brake pads should be parallel to disc surface and equally spaced both sides.

3.1.3 To adjust the gap, piston must be locked in retracted position with wear adjustment bolt. See 2.4

3.1.4 Release hydraulic pressure from brake

3.1.5 Rotate the end cap with a spanner wrench clockwise so that the brake pad comes into contact with disc.

3.1.6 Now turn endcap counterclockwise or unscrew by 1/3 rotation or less so that air gap is 1 mm. Check the gap between disc and friction pad using shim or feeler gauge (it should be approximately 1 mm)

3.1.7 Apply hydraulic pressure to brake. Check the air gap again. It should be 1 mm when pressurized and released. Re-adjust if needed.

3.2 Wear-in procedure

To achieve the rated coefficient of friction from the friction pad will require a short wear-in period before use. The coefficient of friction will be significantly lower before wear-in. This can be done with series of test stops or intermittent slipping until sufficient coefficient is achieved. It is recommended to use new friction pads with a new brake disc. If replacing pads, existing disc can be used.

Organic friction

Wear-in of organic friction can be done by completing a number of braking stops under 5 seconds each. Allow 5 minutes or more to cool between each.

During the wear-in process, disc temperature should be closely monitored. Maximum brake disc temperature during wear-in process should not exceed 200°C.

Alternatively, if the equipment can drive through 30% of the brake torque, then this can be done using 30% of brake clamping force and repeating intermittent braking cycles.

Use 70% of the balancing pressure. Drive disc with the brake engaged for 5 seconds or less, let cool 5 minutes.

Repeat either action approximately 20 times or until sufficient torque is reached. Brakes can be worn in individually where multiple brakes are arranged on a single disc.

Sintered friction

Wear-in process of sintered friction is the same as for organic friction but applied force can be 50% of rated clamp force. Use 50% of balance pressure.

During wear-in process speed should be as high as possible but not exceeding limits for friction pad and application.

Maximum brake disc temperature during bedding process should not exceed 350°C for sintered friction pad.

4.0 Maintenance

⚠ Caution

Use only genuine Airflex replacement parts. Use of other after-market parts will severely affect performance.

⚠ Warning

Prior to maintenance work, the machinery must be locked in a secure position. failure to do so could result in a serious personal injury or possibly death.

For a complete re-build, servicing of the brake, use friction, seal and spring kits and go through the following sections to rebuild the brake.

4.1 Checking spring pack force (Balance pressure)

Spring pack force is a critical function of the brake and should be checked frequently. Reference the corresponding balance pressure in appendix-C

If spring pack has been replaced, the brake should be actuated approximately 15 times before measuring balance pressure

It will be beneficial to have a hand pump connection to the caliper circuit for checking balance pressure.

4.1.1 Pressurize the brake

4.1.2 Remove any cover from the endcap hole

4.1.3 Thread the wear adjustment bolt a few turns into the center rod (1.5)

4.1.4 Place a dial indicator against the center of the bolt

4.1.5 Slowly release the pressure and note the pressure while the piston assembly moves 1mm. Record the pressure when the piston assembly has moved 1mm

4.1.6 Compare this reading to the balance pressure range in Appendix-C.

4.1.7 Note 5% below the lower reading is acceptable for inaccuracy in readings

4.1.8 A reading below this range indicates the need to inspect the spring packs or replace them.

4.2 Brake pad replacement

⚠ Warning

Prior to the removal or installation of brake pads, the machinery shall be locked in a secure position and that actuating, control systems are locked out or disconnected to prevent accidental actuation during maintenance. Failure to do so could result in serious personal injury or possibly death.

⚠ Caution

Use only genuine Airflex friction material. Use of other after-market friction materials will result in unpredictable brake performance.

⚠ Caution

Beware of pinch points and never place hands or fingers between a brake pad and the disc.

Brake pads must be replaced when most of the pad is worn down, or 10.0 mm. Each brake pad consists of a steel backing plate and a friction pad. In the new condition, total overall thickness is 30mm. friction pads should be handled with care so that they are not damaged and are kept free from any dust, oil or grease.

4.2.1 Secure piston position in the released condition as per section 2.4

4.2.2 If possible, support pad weight using the M8 tapped holes on the friction backing plate.

4.2.3 Remove shoulder bolts and return springs (1.18, 1.19)

4.2.4 Remove outer M8 bolts (1.16) on each of the keeper plates (1.15) and pull pin (1.14) with the plate out approximately 20-25mm while support friction pad. The tapped hole in the keeper plate (1.15) can be used to help drive pin out if needed.

4.2.5 Remove each brake pad.

4.2.6 Slide each new pad assembly into position. Insert shear pin (1.14) keeper plate and M8 bolt.

4.2.7 Assemble shoulder bolt and return spring.

4.2.8 Refer below table for M8 bolt and Shoulder bolt torque.

Fastener	Tightening torque
M8 Bolt (1.16)	41NM (30 FT-LBS)
Shoulder Bolt (1.18)	28NM (21 FT-LBS)

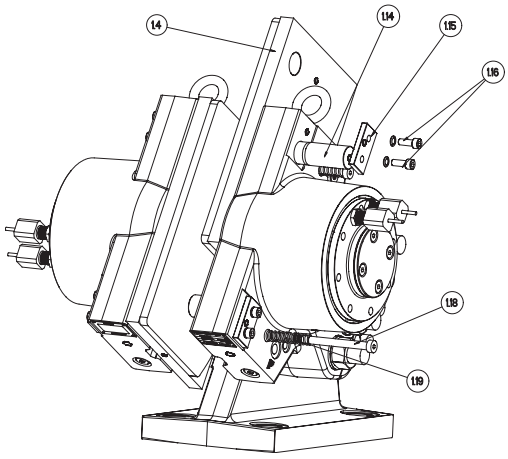


Figure 10

4.2.9 After replacing the brake pads, air gap should be adjusted as per section 3.1

4.2.10 After completing the assembly, follow wear-in procedure as per section 4.2

4.3 Brake removal

4.3.1 Remove brake pads per section 4.2 or lock pistons per section 2.4

4.3.2 Insure brake is properly supported by lifting straps.

4.3.3 Remove the M24 and M20 mounting nuts and washers. Leave bolts in place to aid in brake removal

4.3.4 Remove one half of the brake assembly by sliding off the mounting bolts.

4.3.5 Remove the other half and bolts

For replacement of the following and other spares it is recommended to uninstall the brake and move to a workbench.

4.4 Seal replacement

⚠ Warning

Before the disassembly of the brake, ensure that there is no pressure in the system

⚠ Caution

Use only genuine Airflex parts. Use of other after-market parts will severely affect performance

⚠ Caution

When removing spring stack, note the orientation and configuration of all springs. If re-using, they must be replaced in the same orientation and with the same shims

4.4.1 Place one caliper half flat on a bench surface with endcap facing up

4.4.2 Seals should be replaced all at once using a replacement kit. Part number- 11343880. Refer to appendix H

4.4.3 After the friction is removed, unscrew the endcap counterclockwise to take it out of caliper body. Keep track of O-ring seal (1.11)

4.4.4 Using an M24 X 3 eyebolt or threaded stud in the center rod (1.5) remove piston subassembly (1.2 and 1.5)

Note - Ensure at least 1 pressure port is open, and not plugged.

⚠ Caution

Handle piston with care, its outer diameter should not be damaged in any way

4.4.5 Clean the bore and remove the three seals (1.7, 1.8, 1.9) carefully using a thin, non-marring tool. Take care not to scrape or damage the seal grooves

4.4.6 Bearing guide rings are split and can be removed (1.10 and 1.12) Note- If the smaller bearing guide ring (1.12) is difficult to remove, it can be left in place and re-used

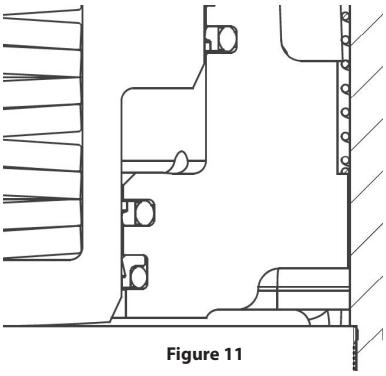


Figure 11

4.4.7 Clean the bore and seal grooves. Install new pressure seals, energizing O-ring first, noting orientation above Figure 11

*Note- Use gentle, kidney shape bend method to carefully install seals without any sharp bends. Push final area into place firmly. Seals can be heated in warm water to aid in installation, 130° - 140°F (54° - 60°C) maximum. Soak for several minutes (O-ring not necessary)

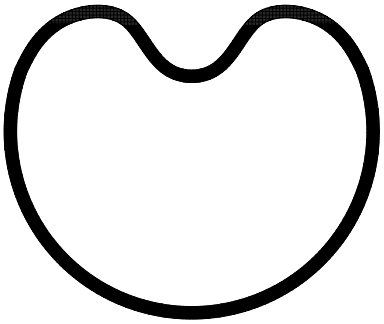


Figure 12

4.4.8 Install wiper seal (1.7) noting orientation, same method

4.4.9 Lightly oil both the bearing guide rings using the compatible hydraulic oil (1.10 and 1.12)

4.4.10 Carefully clean the piston (1.2) and lightly oil outside diameter with compatible hydraulic oil. Place the piston assembly into the caliper bore, squarely on the seals.

4.4.11 Press the piston/center rod assembly squarely into the seals until the top of the center rod (1.5) and bottom piston (1.2) face are even with the body

4.4.12 If any springs are damaged or are being replaced, follow the next section to replace all springs

4.4.13 Replace endcap and thread it in clockwise until 10 mm from the caliper body (figure 13)

4.4.14 Install O-ring into the groove between endcap and the body

4.5 Disc spring replacement

Frequent balance pressure checks will ensure proper spring and brake function. If this maintenance check is found to be out of specified limits, the spring pack can be replaced. If re-using existing spring packs, be sure to keep the orientation and stack configuration as it was removed, including shims specific to each stack. If re-using, clean and re-grease the spring stack. If any spring is found to be broken the stack should be replaced using a kit from Appendix H

4.5.1 After removing endcap (1.3) Remove piston/center rod assembly (1.2) from caliper brake body as described in 4.4.4 using eyebolt or threaded rod. Take care to not scratch or damage the outside piston surface

4.5.2 Remove disc springs from piston and center rod assembly by inverting or by using a magnet. *Note orientation and shims* Shims will always be on top of the spring stack, against the endcap (1.3)

4.5.3 If re-using, then clean, inspect and re-grease the springs using Mobilgrease XHP 222 Special grease or equivalent

4.5.4 Clean and inspect piston and seals. Replace seals following previous section and replace piston assembly into the body

4.5.5 With new or existing springs, they should be greased between each spring face and at contact points between sets. Also grease the center rod before inserting springs into piston assembly

4.5.6 After spring stack has been greased and replaced in the correct orientation, shims should be placed on top of the stack over the center rod (1.5)

4.5.7 If not done so already, place piston and center rod sub-assembly in cylinder body with the springs

4.5.8 Thread the endcap back into the caliper body until the top face is 10 mm from the body as shown in figure 13

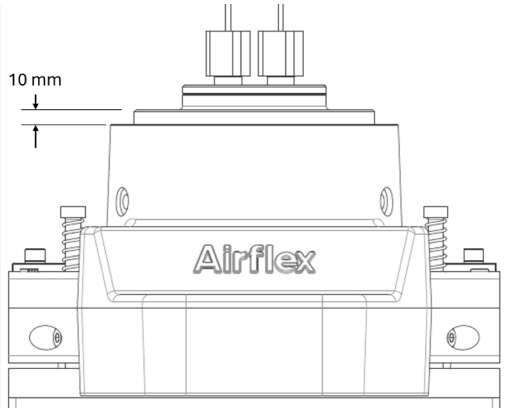


Figure 13

4.6 Sensor/Indicators

4.6.1 Brake status sensors do not normally need servicing

4.6.2 Check the signal outputs are functioning properly as outlined in the installation section, 2.5

Appendix A – Exploded part number drawings

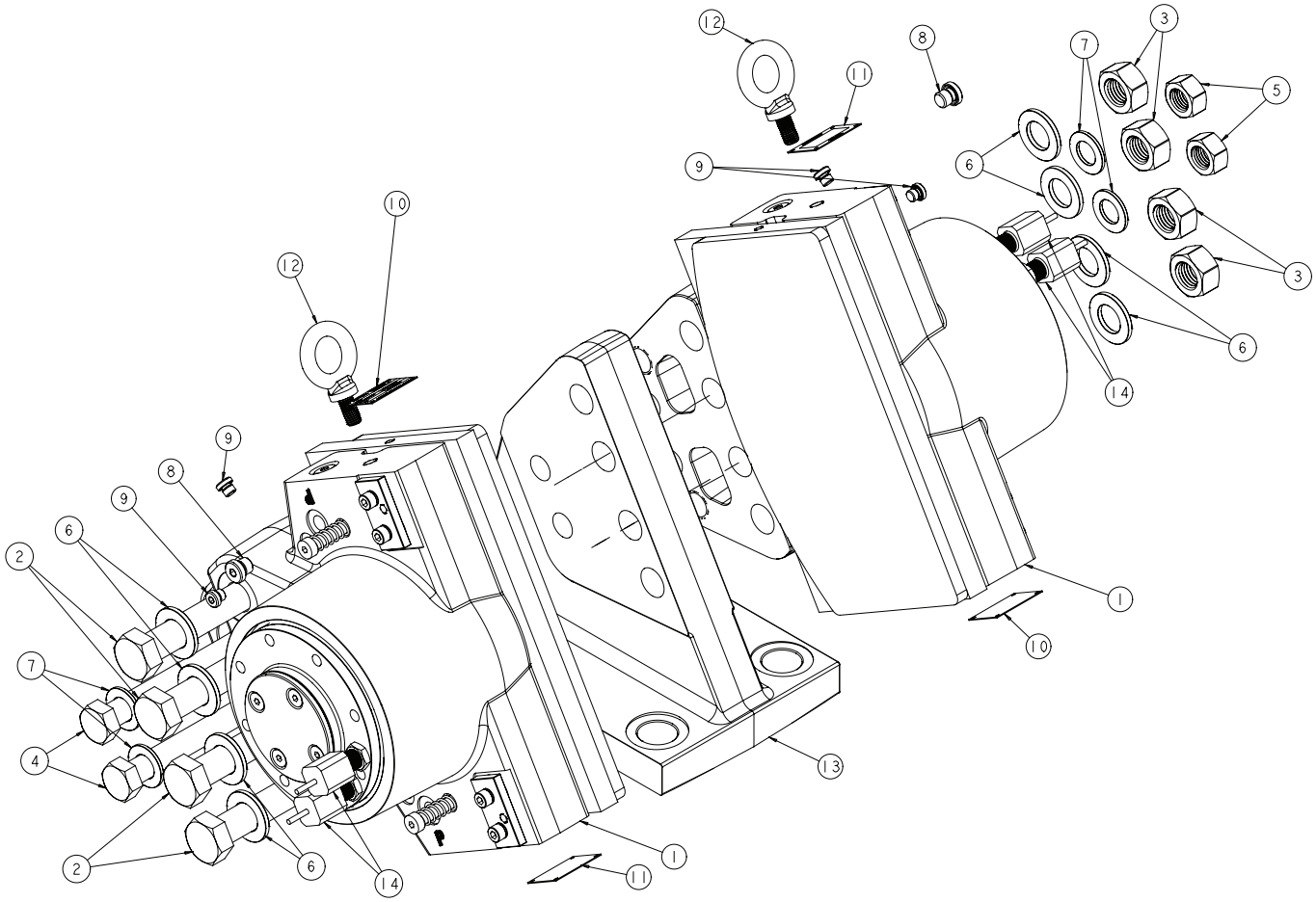


Figure 1

Table 1

Item	Description	Item	Description
1	Brake Sub Assembly	8	1/4" BSPP Plug
2	M24 Mounting Bolt*	9	1/8" BSPP Plug
3	M24 Mounting Nut*	10	Name Plate
4	M20 Mounting Bolt*	11	Warning Plate
5	M20 Mounting Nut*	12	Eyebolt
6	M24 Washers*	13	Bracket*
7	M20 Washers*	14	Sensor*

*Mounting bolts, sensors and bracket are optional

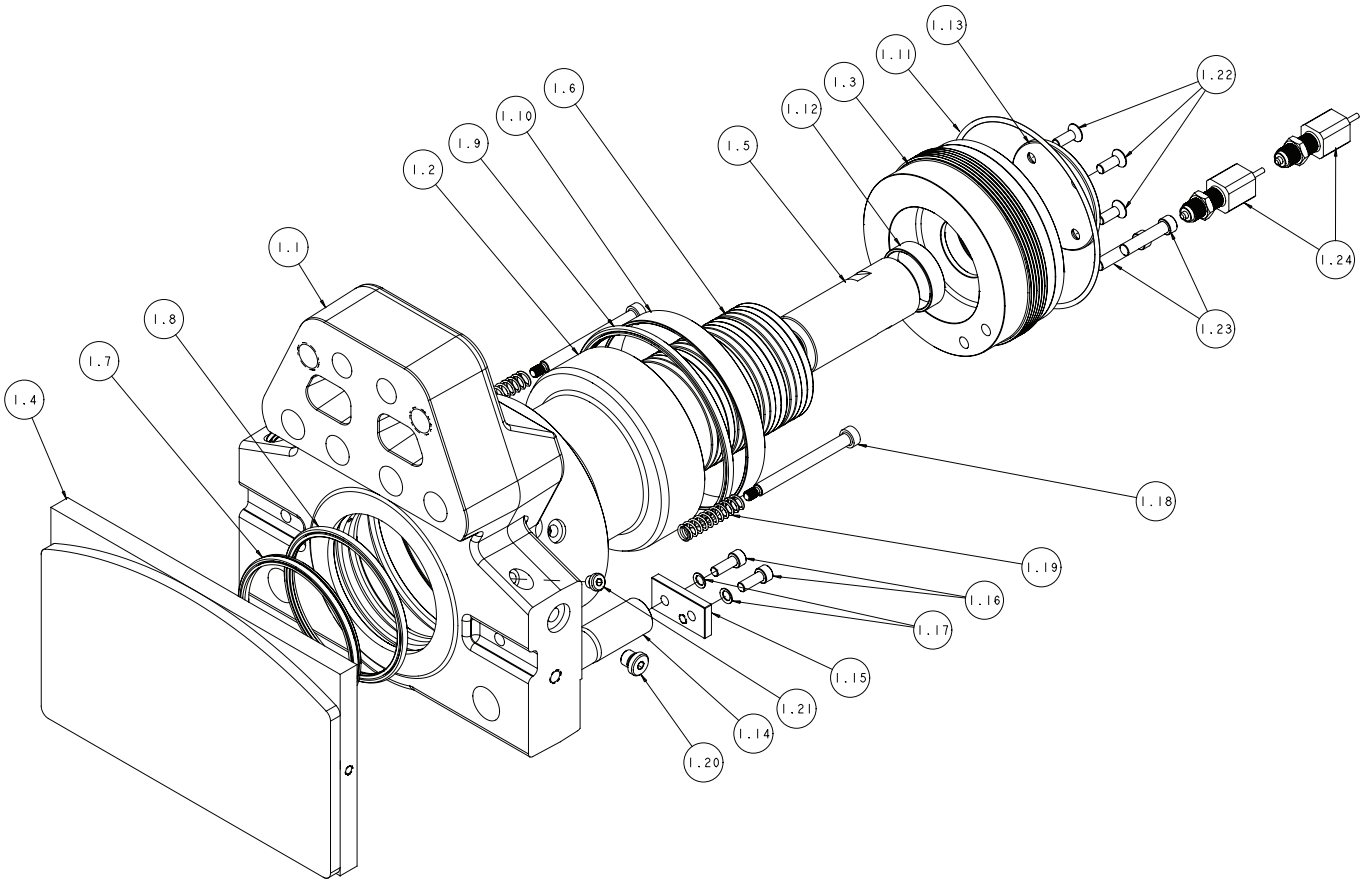


Figure 2

Table 2

Item	Description	Item	Description
1.1	Body	1.13	Top Cover
1.2	Piston	1.14	Shear Pin
1.3	End Cap	1.15	Keeper Plate
1.4	Friction Sub-Assembly	1.16	M8 Bolt
1.5	Center Rod	1.17	Lock Washer
1.6	Disc Spring Kit	1.18	Shoulder Bolt
1.7	Wiper Seal	1.19	Return Spring
1.8	Rod Seal 1	1.20	1/4" BSPP Plug
1.9	Rod Seal 2	1.21	1/8" BSPP Plug
1.10	Bearing Ring 1	1.22	M8 Flat Head Screw
1.11	O-Ring	1.23	Sensor Pin*
1.12	Bearing Ring 2	1.24	Sensor*

*Sensors are optional

Appendix B – Mounting drawing

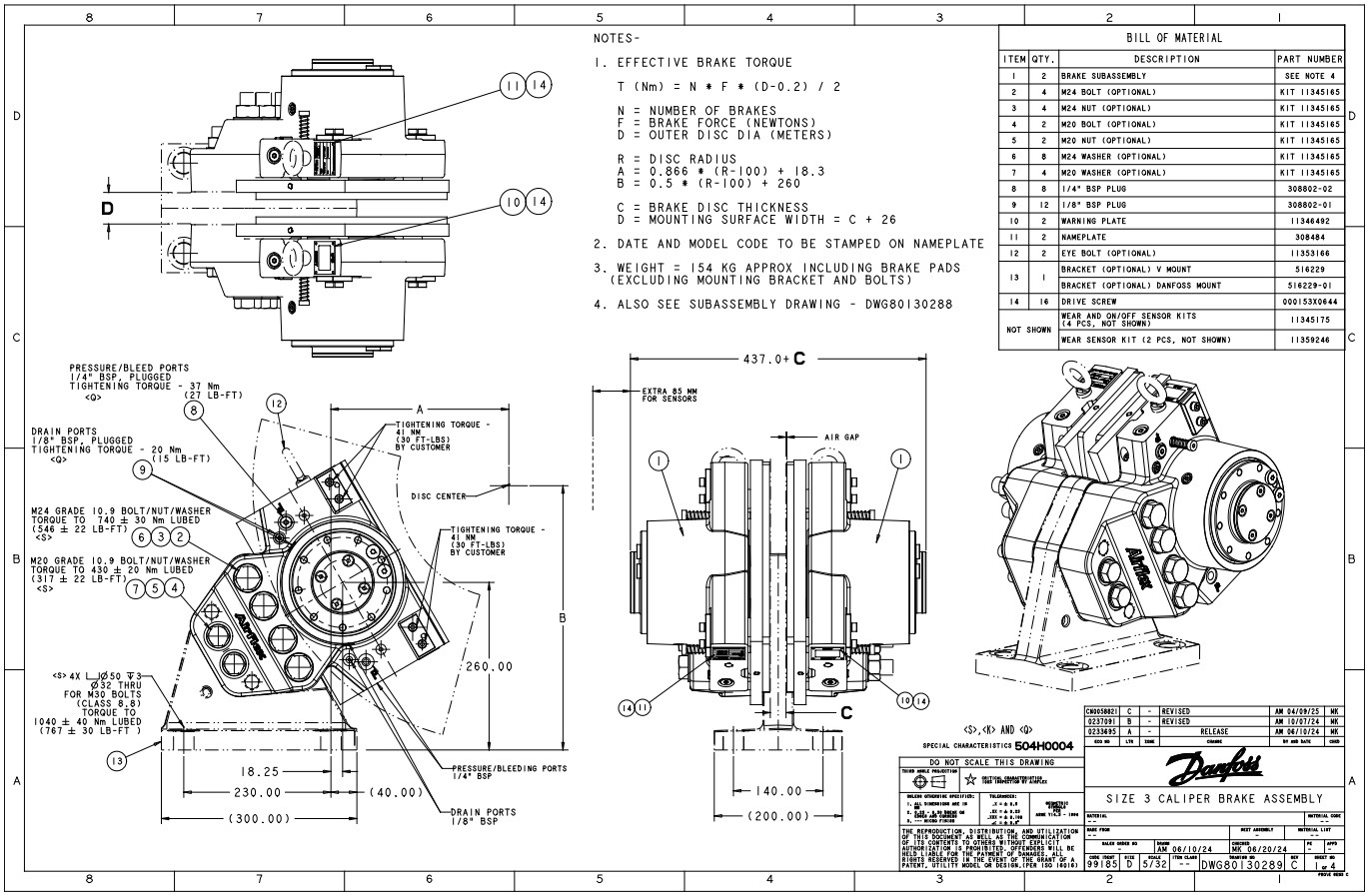


Figure 16

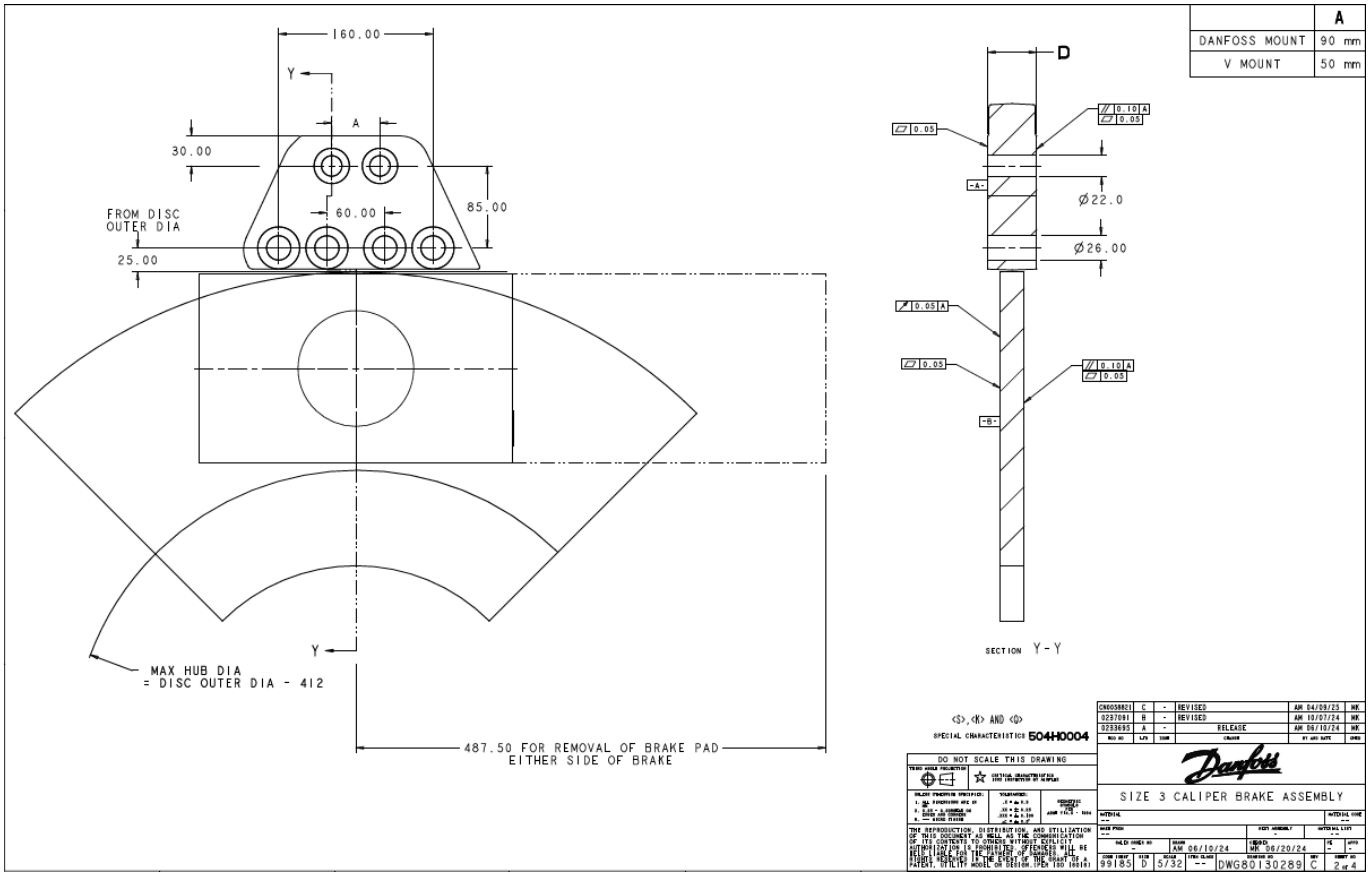


Figure 17

Appendix C – Technical data sheet

Clamp force [1]		Brake force [2]	Loss of force per mm	Operating pressure		Balance pressure min		
KN (min)	KN (max)	KN	%	Bar	psi	MPa	Bar	psi
20.0	23.0	16.0	5	40	580	2.3	22.7	330
24.8	27.0	19.8	4	45	653	2.8	28.2	409
30.0	33.5	24.0	3	50	725	3.4	34.1	494
40.0	44.0	32.0	4	65	943	4.5	45.5	659
46.0	50.0	36.8	6	75	1088	5.2	52.3	758
50.0	55.0	40.0	6	80	1160	5.7	56.8	824
56.0	60.0	44.8	5	90	1305	6.4	63.6	923
60.0	66.0	48.0	5	95	1378	6.8	68.2	989
70.0	77.0	56.0	4	115	1668	8.0	79.5	1154
80.0	88.0	64.0	6	130	1885	9.1	90.9	1319
85.0	95.0	68.0	7	140	2031	9.7	96.6	1401
90.0	98.0	72.0	11	145	2103	10.2	102.3	1483
100.0	109.0	80.0	11	160	2321	11.4	113.6	1648
110.0	119.0	88.0	9	175	2538	12.5	125.0	1813
120.0	130.0	96.0	8	190	2756	13.6	136.4	1978

1) All figures are based on 1mm air gap

2) Braking force is based on minimum clamping force, nominal coefficient of friction μ = 0.4 and 2 brake surfaces

Brake torque

Brake torque (T) in newton-meters, can be calculated from below formula.

T (Nm) = N x F x (D-0.2)/2

Where:

N = Number of brakes

F = Brake force (in newtons)

D = Disc outer diameter (meters)

Basic information

Weight of caliper (without bracket)	150 kg
Pad area (organic)	59534 mm^2
Max. wear of pad (organic)	10 mm
Pad area (sintered)	35948 mm^2
Max. wear of pad (sintered)	10 mm
Nominal air gap	1 mm
Nominal coefficient of friction	0.4
Total piston area each caliper half	88 cm^2
Total piston area each caliper	176 cm^2
Volume for each caliper at 1 mm stroke	17.6 cm^3
Actuating time (approximate)	0.3s
Pressure connection/port	1/4" BSPP
Drain connection/port	1/8" BSPP
Operating temperature range	-20°C to +70°C
Max operating pressure	230 Bar (23MPa)

Appendix D – Sensor data sheet

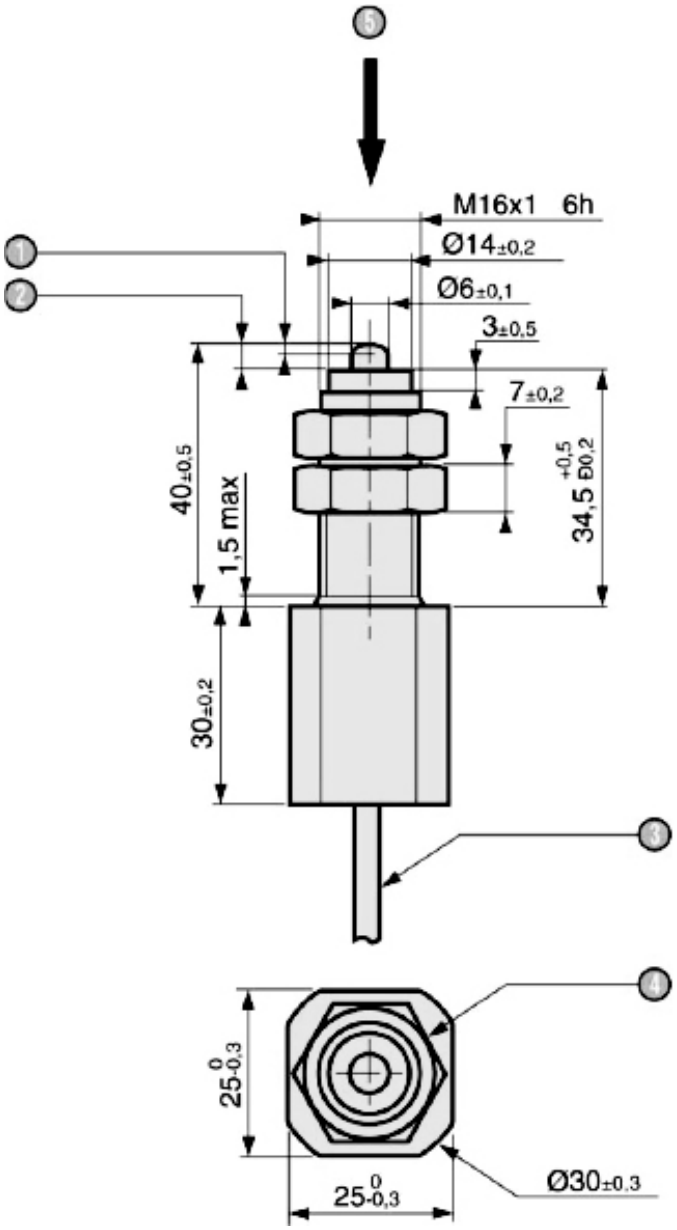


Figure 18

Sr.No.	Description
1	Operating travel
2	Total travel
3	Cable Ø5 - 3 x 0.75 mm² Length 0.50 m
4	21 across flats
5	Direction of operation



Figure 19



Figure 20

Function

Single break two-way contact element (form C : changeover)

Sr.No.	Description
1	Black (common)
2	Grey (NC)
4	Blue (NO)

Additional characteristics

Material
- Case : Thermoplastic polyester
- Plunger : Stainless steel
- Contact : Agcdo - AgNi (gold-plated)
- Nuts : Galvanized steel

Sealing
- O-ring : Silicon
- Scraper seal : Teflon

PU resin

Specifications

Conformity to standards	NFC 20030 class I (the plunger is operated manually by an earthed metal part, or by an insulated part which provides additional insulation).
Version	Single-pole
Protection	IP66 resistant to hydrocarbons and saline mist (400 hours)

Electrical characteristics

Electrical endurance	Standard : 8 A 250 VAC : 30,000 operations 200 mA 24 V DC relay load L / R = 3 ms 10^7 operations Dual-current : 1 mA 4 VAC : 10^7 operations 200 mA 24 V DC relay load L / R = 3 ms 5 x 10^6 operations 5 A 250 VAC : 30,000 operations
Dual-current	This version is designed to operate both on dual-current (1 mA 4 V minimum) and medium-current (5A) circuits. However, a given product should only be used to switch one type of circuit during its working life.

Connections

Cable	PVC Ø5 - 3 x 0.75 mm^2 Length 0.50 m Conforming to NFR 13414/13415
Mounting	Max. tightening torque 9 Nm

Mechanical characteristics

Minimum operating force (N)	10
Minimum total travel force (N)	15
Minimum operating travel (mm)	2
Differential travel (mm)	0,1
Maximum total travel (mm)	4,5
Mechanical life (millions of operations) mini.	10^7
Operating temperature (°C)	-40 to +85
Protection rating	IP66/67
Weight (g)	80

Appendix E – Recommended fluid

- Recommended fluid: ISO VG46 or ISO VG32, conventional mineral based hydraulic oil compatible with PTFE and nitrile rubber seals.
- If changing the type of fluid, the entire system should be flushed and changed completely.
- Hydraulic system filters should be changed every 6 months at minimum.

Appendix F – Storage

- The caliper brake can be stored for 12 months in a dry environment. Longer periods should include pressurization cycles to actuate the brake and keep seals active. Cycle each brake 20 times every 12 months.

Appendix G – Disposal

- Brake Pads- Friction pads are steel with organic or sintered friction. Friction materials are free from asbestos. Pads can be recycled as steel.
- Hydraulic Oil – Hydraulic oil can pose health and environmental risks and should be recycled with local certified recycling center or a local hazardous waste facility.
- Brake – The brake is comprised of cast iron and steel. After draining hydraulic oil and removing seals, the brake can be recycled as iron or steel.
- Seals – Seals and O-rings are made up of PTFE or nitrile rubber. They can be treated as normal waste.
- Sensors – If equipped with sensors, they should be treated as electronic waste.

Appendix H - Maintenance kits

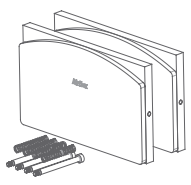
Kit description	Part Number	Description
*Seal	11343880	All seals, for 1 brake
*Organic friction	146623	2 pads + Hardware
*Sintered friction	11345174	2 pads + Hardware
Friction hardware only	11345138	4 shoulder bolts + 4 springs
Brake mounting bolts	11345165	6 bolts for 1 brake (M24, M20)
Wear or On/Off sensor	11359246	2 sensors, 1 each side
Both sensor kits	11345175	4 sensors, 2 each side

*Recommended Spares

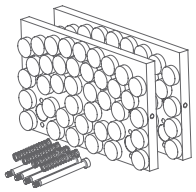
Seal kit 11343880

Item	Description	Part Number	Qty	Image
1.7	Wiper Seal	000153X1363	2	
1.8	Small Rod Seal	000153X1364	2	
1.9	Large Rod Seal	000153X1365	2	
1.10	Large Bearing Guide Ring	000153X1371	2	
1.11	O-ring	000153X1367	2	
1.12	Small Bearing Guide Ring	000153X1366	2	

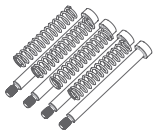
Organic friction kit 146623

Item	Description	Part Number	Qty	Image
1.4	Organic friction pad	417653	2	
1.18	Shoulder bolt	308791	4	
1.19	Return spring	308790	4	

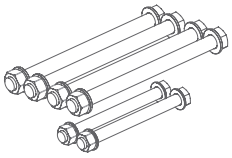
Sintered friction kit 11345174

Item	Description	Part Number	Qty	Image
1.4	Sintered friction pad	11344167	2	
18	Shoulder bolt	308791	4	
19	Return spring	308790	4	

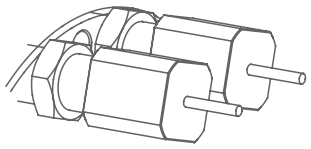
Friction retraction bolt kit 11345138

Item	Description	Part Number	Qty	Image
18	Shoulder bolt	308791	4	
19	Return spring	308790	4	

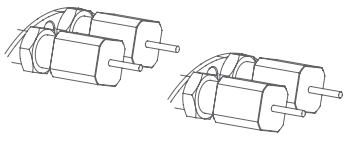
Mounting bolt kit 11345165

Item	Description	Part Number	Qty	Image
2	M24 Bolt	000391X2410	4	
3	M24 Nut	000414X0017	4	
4	M20 Bolt	000391X2010	2	
5	M20 Nut	000414X0019	2	
6	M24 Washer	11350693	8	
7	M20 Washer	11350695	4	

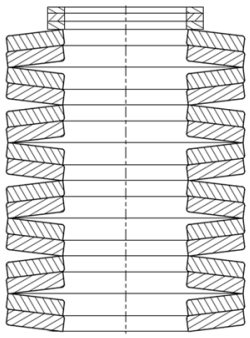
Sensor kit 11359246

Item	Description	Part Number	Qty	Image
1.24	Wear or On/Off	000153X1372	2	
1.23	Pins	516227	2	

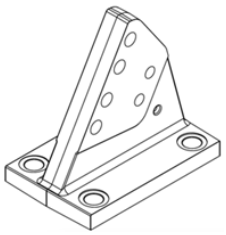
Sensor kit 11345175

Item	Description	Part Number	Qty	Image
1.24	Wear and On/Off	000153X1372	4	
1.23	Pins	516227	4	

Disc spring kits (Item 1.6)

Part Number	Force range (KN)	Qty req	Image
417664-01	20-23	2	
417664-02	24.8-27.3	2	
417664-03	30-33.5	2	
417664-04	40-44	2	
417664-05	46-50	2	
417664-06	50-55	2	
417664-07	56-60	2	
417664-08	60-66	2	
417664-09	70-77	2	
417664-10	80-88	2	
417664-11	85-93	2	
417664-12	90-98.5	2	
417664-13	100-109	2	
417664-14	110-119	2	
417664-15	120-130	2	

Optional bracket

Item	Description	Part Number	Qty	Image
13	Bracket (Danfoss mount)	516229-01	1	
13	Bracket (V Mount)	516229	1	

Ordering information/ technical assistance

Reference the information on the nameplate when calling or writing

For technical support:

Phone: +1 800-247-3539

Email: mail to: airflexAE@danfoss.com

For customer service:

Phone: +1 888-258-0222

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