



5021-SA DISK BRAKE SPRING / AIR VERSION

Owner's Operation, Installation & Maintenance Manual

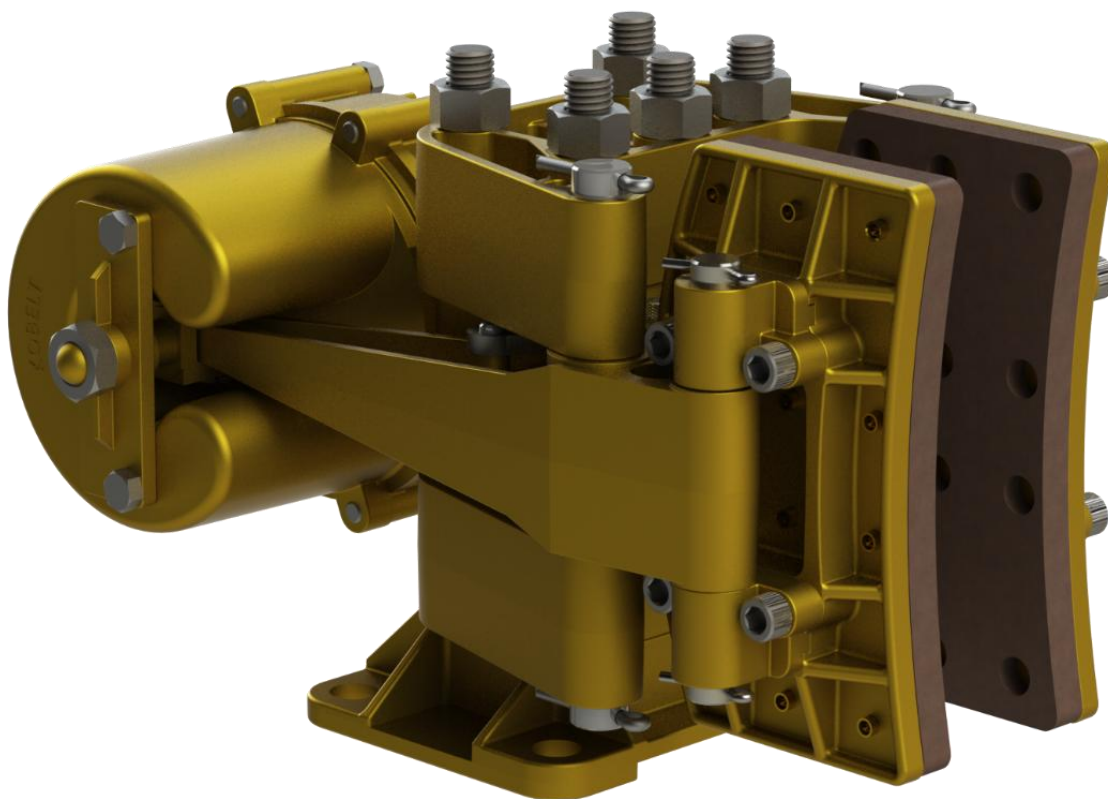


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1 INTRODUCTION

1.1 CONTACT INFORMATION

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For further instructions, please contact our distributors or visit our website.

1.2 SAFETY INFORMATION

1.2.1 Safety Instructions

Notice to Installer:

Disregarding the following safety measures can result in an accident causing severe injury to personnel and damage to material assets:

- Only use the product as directed in this manual.
- Never put the product into service if there is evidence of visible damage.
- Never put the product into service before fully completing installation and commissioning.
- Do not carry out any modifications to the product.
- Only use authentic Kobelt spare parts.
- Observe all local regulations, directives and laws during the installation of this product.
- All installation, commissioning and maintenance work must only be conducted by qualified personnel. (For the purpose of this manual, qualified personnel are persons who are familiar with the assembly, installation, commissioning, and operation of the product and who have the qualifications necessary for their occupation.)
- Observe all specifications in this manual. If these guidelines are not followed and damage occurs, the warranty will be voided.

1.2.2 Hazards

Throughout this publication, Warnings and Cautions accompanied by the International Hazard Symbol  is used to alert the user to special instructions concerning a particular service or operation that may be hazardous if performed incorrectly or carelessly.

 DANGER	Equipment Starts Automatically: Brake systems frequently are controlled remotely and may activate suddenly causing bodily harm. Ensure all power sources are locked out prior to performing work.
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 DANGER	Brake Actuators Contain Compressed Springs: The brake actuators contain springs that are under compression even when the brakes are not pressurized. The springs will release suddenly if disassembled incorrectly posing a risk of serious injury or death. Do not attempt to disassemble the actuators without clear work instructions and training.
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 WARNING	Pinch Points: Brakes contain numerous pinch points which can cause serious injury. Ensure all power sources are locked out prior to performing work.
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 WARNING	High Pressure Fluids: Kobelt lever brakes use high pressure hydraulics. Ensure all pressure is exhausted and the pressure source locked out prior to performing work.
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 WARNING	Hot Surfaces: Disc brakes are capable of making the surfaces of the brake disc dangerously hot when burnishing or during braking events. Ensure the disc is adequately guarded to prevent inadvertent contact with the disc.
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SAFETY INSTRUCTIONS	Airborne Dust: Brake linings contain fibers that may become airborne during cutting or sanding operations. Over exposure to these dusts should be considered hazardous. Use NIOSH approved respirators when working with brake linings. Request a MSDS for further information.
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1.3 PRODUCT DESCRIPTION

1.3.1 Overview

The diagram below shows a typical Kobelt caliper brake with all the major components identified. All of the Kobelt caliper brakes can be fitted with either air applied, hydraulic applied, spring applied with air released or spring applied with hydraulic released actuators depending on the required service.

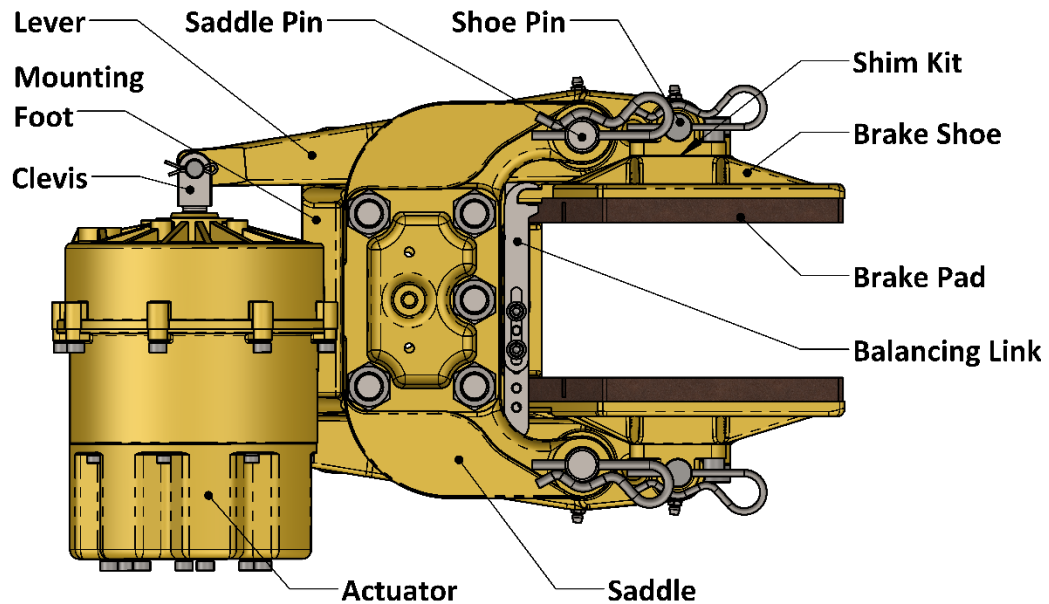


Figure 1: Caliper Brake Nomenclature

1.4 TECHNICAL DATA

Table 1: 5021-SA Technical Data

MODEL	NORMAL FORCE	PRESSURES	
		RELEASE	HOLD-OFF
5021-SA	4700 lbs [20.9 kN]	102 psi [7.1 bar]	89 psi [6.2 bar]
5021-SA90	4250 lbs [18.9 kN]	87 psi [6.0 bar]	79 psi [5.4 bar]
5021-SA75	3700 lbs [16.5 kN]	76 psi [5.2 bar]	68 psi [4.7 bar]
5021-SA60	2970 lbs [13.2 kN]	62 psi [4.3 bar]	53 psi [3.7 bar]

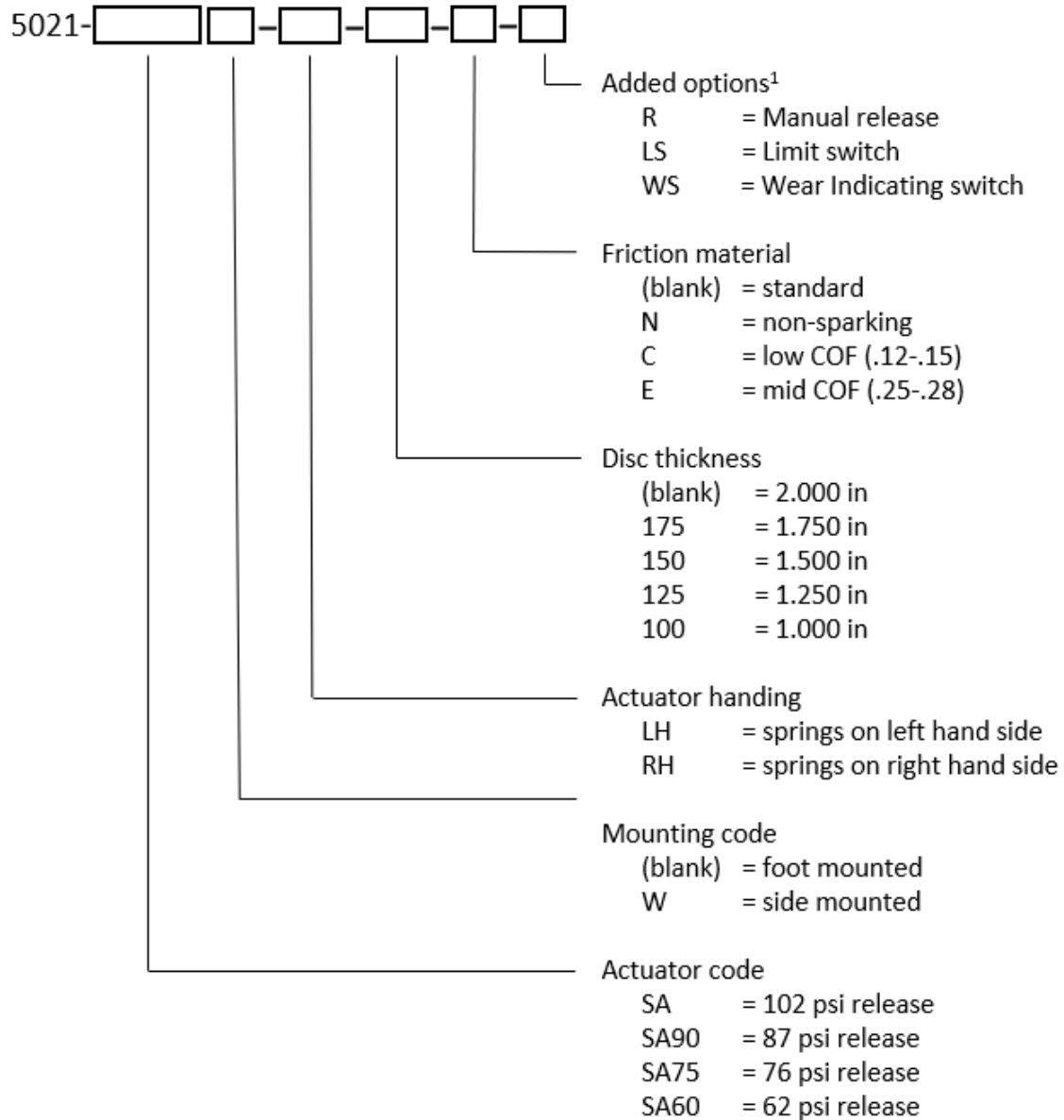
Maximum Pressure:	250 psi	[17.2 bar]
Port Size:	¼ NPT	
Actuator Volume:	16.6 in ³	[273 cc]
Temperature Range:	-40°F ...+120°F	[-40°C ...+49°C]
Disc Thickness:	2 in	[51 mm]
Max Running Clearance:	.06in	[1.5 mm]
Minimum Disc Diameter:	20 in	[508 mm]
Maximum Disc Diameter:	unlimited ¹	
Total Pad Area:	53 in ¹	[344 cm ²]
Weight:	57 lbs	[25.9 kg]

1) Requires a minimum 4.34 in [110 mm] wide face

Technical data and specifications are also available from our datasheet posted on www.kobelt.com or the technical drawings in Appendix A.

1.5 MODEL CODE KEY

Brake Model Code Key



1) Options are not compatible with one another

2 INSTALLATION

2.1 PREPARATION

The foundation plate to support the brake caliper must be designed to withstand the maximum braking forces generated by the brake caliper. The foundation must also be flat to ISO tolerance grade IT8 and square to the brake disc. See Appendix A for key installation dimensions. The brake pedestal must be designed to allow the mounting bolts to be inserted from underneath.

The rotating element should have bearings sufficient to carry the weight of the disc and also resist the additional stress when the disc brake is applied.

The spigot that centers the brake disc must not be designed in such a way that it impedes the thermal expansion of the disc.

Actuator ports are plugged to prevent contamination of the seals. Remove the plugs prior to connection to the piping.

Brake discs are shipped with a light rust inhibitor applied to the surfaces. Remove the rust inhibitor using solvent and a cloth prior to installation.

Any guarding around the brakes must provide enough room to allow full extension of the brake actuators plus full pad wear adjustment.

2.2 BRAKE DISCS

The brake disc must be installed onto the rotating element before installing the caliper. Brake discs must meet the following requirements:

Table 2: Brake Disc Requirements

MODEL	5000-SERIES
AXIAL RUN OUT	IT9 (TIR) ¹
RADIAL RUN OUT	IT11 (TIR) ¹
FLATNESS	.003 in [.08 mm]
PILOT FIT	H9/f8
SURFACE FINISH	63 micro inches [1.6 micrometers] RMS
SURFACE HARDNESS	Light Duty ² HB135 minimum
	Heavy Duty ³ HB235 minimum

¹ International tolerance class. Allowable run out is proportional disc O.D.

² Parking brakes and emergency brakes with stopping times of 10 seconds or less are considered light duty.

³ Ventilated discs are exempted from this requirement

To achieve the runout tolerance the mounting face on the rotating element must be machined flat. Excessive run-out of the disc could cause premature wear of the linings, caliper pins, lever journals as well as the actuators.

The disc mounting bolts used must be of a suitable size and grade to safely resist the brake torque plus the stresses induced from thermal expansion of the disc. For high temperature disc applications, the holes for the mounting bolts must be machined oversized to allow the disc to expand during operation. Ensure that adequate washers are used to bridge the gap between the bolt and bolt hole.

Table 3: Mounting Bolt Radial Clearance

MOUNTING BOLT RADIAL CLEARANCE				
Disc Bolt Circle In [mm]	Maximum Disc Temperature, °F [°C]			
	400 [204]	500 [260]	600 [316]	700 [371]
10 [254]	0.011 [0.3]	0.014 [0.4]	0.017 [0.4]	0.021
15 [381]	0.016 [0.4]	0.021 [0.5]	0.026 [0.7]	0.031
20 [508]	0.022 [0.6]	0.028 [0.7]	0.035 [0.9]	0.041
25 [635]	0.027 [0.7]	0.035 [0.9]	0.043 [1.1]	0.051
30 [762]	0.032 [0.8]	0.042 [1.1]	0.052 [1.3]	0.062
35 [889]	0.038 [1.0]	0.049 [1.2]	0.061 [1.5]	0.072
40 [1016]	0.043 [1.1]	0.056 [1.4]	0.069 [1.8]	0.082

To reduce the size of the mounting bolt clearance hole it is recommended to offset the bolt circle on the brake disc inwards the required amount for radial clearance. The end result is the brake disc will have a slightly smaller bolt circle than the hub and the required radial clearance will be on the side where it is needed.

 WARNING	Do not use fitted bolts for installing brake discs. The bolt holes must be over sized to permit uninhibited expansion.
 WARNING	Do not secure a brake disc to a rotating element by welding.
 WARNING	Do not paint the cooling fins of a ventilated disc. The cooling efficiency will be compromised, and overheating may result.
 WARNING	Keep Discs free from contaminants: Failure to keep the brake discs free some contaminants such as dirt and oil can result in the brake not generating the rated brake force. Discs and brake pads that have been contaminated must be cleaned thoroughly. A burnishing procedure should follow cleaning before returning the brake to service.

If the disc was damaged during installation with nicks or welding marks, remove the defects before putting the disc into service.

For cases where a disc guard or some protective cover is required for a ventilated disc ensure that the guard does not compromise the performance. An improperly designed cover or shield may cause air recirculation through the disc or radiant heat reflection, which could result in the disc overheating. The cooling air pumped through the disc must be exhausted away from the outer diameter of the disc to allow fresh, cool air to enter the inner vent opening of the disc.

2.3 CALIPER BRAKES

2.3.1 Mechanical

Perform the following steps to properly install a caliper brake:

1. Ensure that the brake has been manually opened (see section 3.1).
2. Lower the brake onto the brake pedestal and center over the mounting holes.
3. Using feeler gauges to ensure that the brake air gap is equal on both sides of the disc.

NOTICE

Ensure the caliper is centered. The balancing link will be subjected to excessive stresses that will damage it.

4. Position the brake so that the outer radius of the brake shoe is in full contact with the Disc. Do not move the brake too close as enough radial distance must be provided to allow for disc expansion without causing interference between the outer circumference of the disc and the inner caliper frame.
5. Manually apply the brake onto the disc. The brake shoes will naturally align with the disc.
6. Probe under the brake base with feeler gauges to determine the shimming requirement.
7. Manually release the brake again and lift the brake up approximately two inches.
8. Insert the shims determined from step 6. Use ANSI shims that straddle the mounting bolts.
9. Lower the brake back down, insert the mounting bolts from underneath the pedestal using appropriate flat washers. The nut must be on top of the brake foot. The mounting bolts must be of the type and installed as noted below to ensure a vibration resistant and secure joint:
 - a. Bolt size: 5/8-11 UNC
 - b. Bolt grade: SAE J429, grade 5
 - c. Thread locker: Loctite® 243
 - d. Tightening torque: 113 ft-lbf [153 Nm]

2.3.2 Piping

The piping to the brakes must be adequately sized to ensure rapid response times in all weather conditions. The piping must be selected to safely withstand the pressures required to operate the brakes. Secure the piping against vibration with pipe clamps per the schedule in the table below.

Table 4: Pipe Clamp Table

PIPE CLAMP TABLE				
PIPE SCHEDULE	3/8"-1/2" tube [DN6]	1/4" – 1/2" pipe 1/2"-3/4" tube [DN8-DN15]	3/4" pipe 1"-1.25" tube [DN20]	1" pipe 1.50" tube [DN25]
CLAMP SPACING	3 ft [914 mm]	4 ft [1219 mm]	5 ft [1524 mm]	6.5 ft [1981 mm]

All piping must be cleaned prior to connection to the actuators. Welded carbon steel piping must be pickled to remove the scale produced by welding.

The connections to the brake actuators must be made by hoses of suitable rating to accommodate the movement of the brake levers.

The brake actuators are equipped with different sizes of pressure ports. Consult the technical drawing of the relevant model code for the specific port data. Install the port fitting using thread sealant and tighten to 2 - 3 turns from finger tight. Use brass pipe fittings for making the connection as steel fittings are too heavy and may split the port.

 WARNING	Do not over tighten the fitting in the actuator port as damage to the actuator may occur.
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For spring applied / air released caliper brakes it is recommended to install a quick exhaust valve at each actuator.

For operation in sub-zero temperatures down to a minimum of 0°F [-20°C] the air must be dried to a dew point of -50°F [-44°F]

 DANGER	Failure to adequately dry the compressed air supply may result in the brake valve freezing and rendering the brakes inoperable in sub-zero weather conditions.
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2.3.3 Isolation Valves

It is recommended to install a local isolation valve on the actuator pneumatic supply lines. This will aid maintenance personnel in locking out the brake caliper during maintenance activities. The valve must be capable of withstanding the maximum actuator pressure as given in section 1.4. The valve must be sized to meet or exceed the actuator port size given in section 1.4.

Consult your local governing body in your jurisdiction on the exact requirements for pneumatic isolation valves that lock out pneumatic energy sources during maintenance activities

2.3.4 Instrumentation

Kobelc caliper disc brakes may be equipped with sensors and switches, such as the:

- **6212-MSKIT** brake release indicating switch kit
- **6212-WSKIT** brake wear indicating switch kit

The connection to the switch must be made by cable or flexible conduit and a ½ NPT cable or conduit gland. To access the switch terminals, remove the two captive screws holding on the back cover. Connect the wires to the common (C) and normally open (NO) terminal screws using ring or spade terminals.

Follow the governing electrical code for wiring practices. Use only hardware approved for the zone that the brake is installed in.

3 COMMISSIONING

3.1 CAGING



The Kobelt 5021-SA spring applied / air released caliper brake can be equipped with a manual release kit, part number **6212-RLKIT**. The release kit permits manual release of the brake in the event that fluid pressure is lost or not available. See Table 5 - Table 6 for the tools and technical specification required for caging the actuators.

Table 5: Tools required for actuator caging

Tool/Consumable	Application
3/4in Socket	Manual release screw
Torque wrench, 228 in.lbs capacity	
Loctite LB 771 Nickel based Anti-Seize	Manual release screw lubrication

Table 6: Technical specifications, actuator caging

Specification	Value
Maximum release screw torque.	228 in-lbs [26 Nm]

To manually release the brakes (Cage the actuators);

1. Ensure that the fluid supply line is open to tank or atmosphere to permit the piston to displace the fluid from the actuator.
2. If a release kit is being added to the actuators in the field(not factory installed) ensure that the release kit installation procedure is followed as stated in section 5.3.7.
3. Screw in the manual release screw clockwise to open the brake shoes:
 - a. Ensure the release screw threads have been coated in a nickel based anti-seize as stated in Table 5.
 - b. Use a torque wrench when tightening the release screw. Do not exceed the torque value specified in Table 6. If the brake is not fully released at this torque value, check:
 - i. The release screw threads are clean of debris and have a coating of anti-seize.
 - ii. The brake has had the airgap adjusted per section 5.3.2.

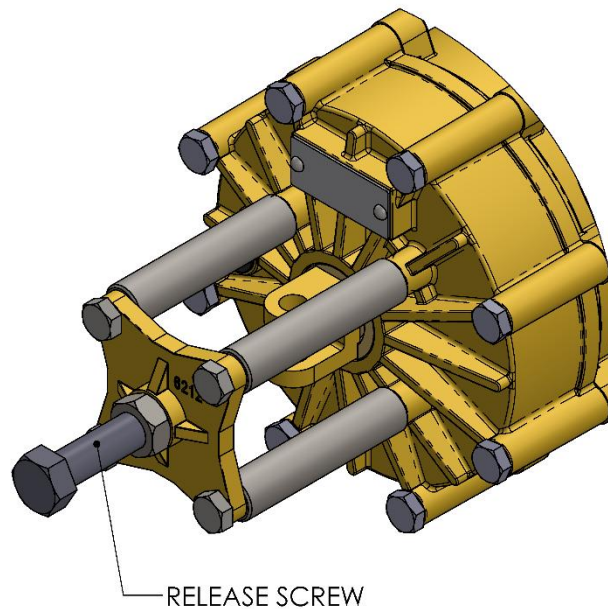


Figure 1: Actuator manual release kit.

4. Ensure the brakes are un-caged before returning the brake to service. The release screw needs to be stowed in the fully retracted position with the jam nut tightened secure as shown in Figure 2.

⚠ DANGER	The manual release screw must be fully retracted prior to putting the brakes into service. Failure to do so may result in a complete loss of brake torque.
⚠ DANGER	Failure to lock the release screw jam nut in the retracted position can cause the release screw to drift. This may result in a complete loss of torque if the screw advances and interferes with the actuator working stroke.

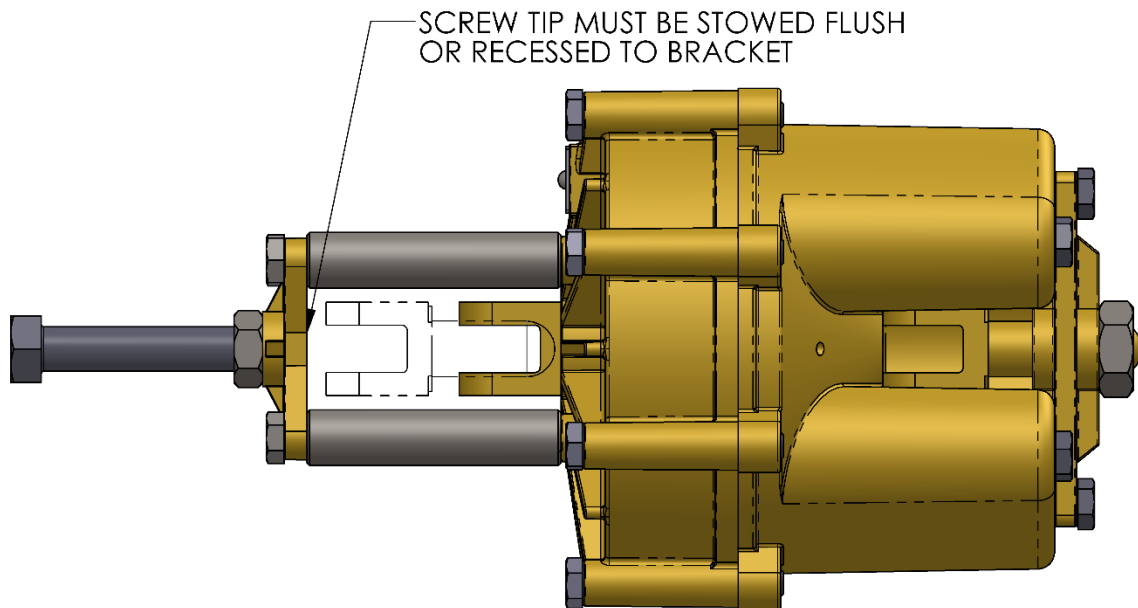


Figure 2: Release screw stow position

Brakes without the manual release screw option will have to be opened using an external pressure source.

3.2 FLUSHING

Kobelc spring applied, air released disc brakes may be used in low pressure hydraulic applications. Before subjecting the brake system to full hydraulic pressure, the brake lines must be flushed to an ISO 4406 cleanliness rating of 19/17/14.

3.3 AIR GAP

Prior to putting the brakes into service ensure that the airgap between the brake pads and disc when the brakes are released is set to .01" [.25 mm] per shoe. Adjust if necessary, per [section 5.3.2](#).

3.4 FUNCTION TEST

Before burnishing the brakes perform a quick inspection and function test of the brakes:

- (1) Ensure that all mounting bolts are properly installed.
- (2) Ensure proper running clearance (air gap) with the disc.
- (3) Ensure unobstructed movement of the brake levers for full actuator extension.
- (4) Ensure the brake disc surface is clean. Remove all contamination from the disc with cleaning solvent.
- (5) Check the source of fluid supplied that it complies with the specified pressure range and that it is properly interlocked with other machinery such as clutches, electric motors, etc.
- (6) Check that all bolts are tight and cotter pins are in place.
- (7) Cycle the brakes and ensure that the brakes are operational

3.5 BURNISHING

Burnishing is required in order to achieve rated brake torque. The process of burnishing removes minor contaminants from the rubbing surfaces and improves the degree of contact between the brake pad and disc.

Before burnishing, the brake disc must be checked to ensure it is free from contamination and oil. Use a solvent and cloth to remove any oil residue. Slight surface rust will be removed during the burnishing process, but heavy rust should be removed prior to burnishing.

If present, safety interlocks of the drive mechanism should be temporarily defeated to allow the disc to be driven with the brake partially applied.

The temperature of the disc surface must be monitored during the burnishing process and kept between 250°F (120°C) and 500°F (260°C). If the upper temperature is reached, pause the burnishing process until the disc is cooled to the lower limit.

Extreme care must be taken not to overheat the disc during the process. On water cooled discs it may be necessary to limit the flow of cooling water in order to achieve the necessary disc temperature for effective burnishing.

 WARNING	Disc temperature must not exceed 700°F (371°C) or permanent degradation of the lining may occur.
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Burnishing is best achieved by applying the maximum torque and minimum speed that the drive can tolerate. Depending on the configuration of the brake system it may be necessary to reduce the burnishing torque by;

- a) Partially releasing the brake with fluid pressure to a level that the drive can tolerate, or
- b) In systems with more than one brake, isolate all but one brake and burnish one brake at a time.

Three important points to consider when burnishing are;

- i. The temperature of the disc must be closely monitored. Excessive heat will damage the friction linings.
- ii. The duration of burnishing varies with each application.
- iii. Burnishing is not complete until the brake is producing rated torque. This will be indicated by the motor current while burnishing.



WARNING

Failure to properly burnish will not allow the brake to produce adequate torque for the intended duty.

3.6 TORQUE TEST

Before putting equipment into service, confirm that full rated braking torque has been achieved through load testing or a torque test against the drive motors. If full brake torque has not been achieved, continue burnishing.

4 OPERATION

4.1 FUNCTIONAL REQUIREMENTS

4.1.1 Pressure Supply

The release pressure for spring applied air release actuators are a maximum of 125 psi. Ensure that the system pressure is adequate to fully release the brakes.

It is necessary to size air compressors and storage tanks to provide sufficient air for the intended duty of the brakes. Actuators and control valves equipped with “U” cups and “O” rings require lubrication in order to provide long service life. Unlubricated seals will have excessive friction and wear. The oil that is required for the lubricator should be a hydraulic type with a viscosity grade of 10 to 32 centistokes. Heavy oils do not work well for lubricators.

The main supply line to the control and brake system should be equipped with a filter, regulator and lubricator. The filter’s function is to remove moisture and dirt in the system and the regulator will provide a constant air pressure to the control system. If the brake system is operating in sub-zero temperatures, it is recommended to have an air dryer in the system to remove all moisture. Alternatively, a lubricator can be filled with methyl hydrate (wood alcohol) to prevent freezing of the air system.

For hydraulic applications the pressure supply system must supply a hydraulic oil appropriate for the service conditions. Consult the table below for approved oils.

Ambient Temperature Range	Approved Oil	Approved Brands
0...+40 °C [+32...+104 °F]	ISO VG 32, VI 60	Rando HD32, Mobil DTE, Tellus S2 V 32
-20...+20 °C [-4...+68 °F]	ISO VG 22, VI 150	Rando HDZ22, Mobil DTE10
+40...+80 °C [+104...+176 °F]	ISO VG 68, VI 60	Rando HD68, Mobil DTE, Tellus S2 V 68
-40 ...-20 °C [-40...-4 °F]	ISO VG 26, VI 300	Univis HVI 26, Tellus S4 VX, Hydrex MV Arctic

In all cases hydraulic circuits must have a relief valve that is set to limit the system pressure to the rated maximum pressure of the actuator. In applications where the brakes cycle infrequently with significant changes in ambient temperature it may be necessary to provide a thermal relief to protect the actuators from over pressurization due to thermal expansion.

4.1.2 Control

Emergency brakes must be controlled by a system adhering to a “fail safe” methodology. Relays, contacts and valves must be “normally open”. The use of detented, manual or spool valves is strongly discouraged as these devices can either be inadvertently closed or fail closed.

4.2 SERVICE LIMITS

4.2.1 Disc Temperature

The Kobelt brake lining achieves maximum friction at 300°F. Over 300°F the brake begins to fade or experience diminishing friction. The maximum operating temperature of the brake linings is 700 °F [371° C]. Temperatures in excess of this limit will permanently damage the linings and require replacement.

4.2.2 Ambient Temperature

In sub-zero temperatures, ventilated discs must be warmed up gently to avoid causing excessive thermal stresses in the disc. Failure to do so could cause the disc to crack. Once the temperature of the disc is out of freezing condition it can be used as normally intended.

Operating temperature of standard brake actuators is -40°C [-40°F] to 55°C [131°F]

4.2.3 Pressure

Do not allow the supply pressure to exceed the values given in the [Technical Data](#) section. If the available supply pressure exceeds the maximum allowable working pressure, then some form of a pressure regulator is required. Also, the pressure supply system must be equipped with a safety relief valve to ensure the given maximum allowable working pressure.

4.2.4 Disc speed

The potential imbalance in the ventilated disc could be detrimental to rotating equipment at high speeds. For running speeds greater than the values listed in the table below the discs must be balanced. Under no circumstances must the running speed exceed the value given in the right-hand column.

Table 7: Maximum Disc Speeds

Part Number	Nominal OD		Max. Speed	
	inch	mm	rpm	
2" x 4" Series			Standard	Balanced
2-4-18	18	457	1450	3070
2-4-20	20	508	1260	2750
2-4-25	25	635	960	2200
2-4-30	30	762	770	1800
2-4-35	35	889	650	1550
2-4-40	40	1016	560	1350
2-4-45	45	1143	490	1200
2-4-50	50	1270	440	1070

5 MAINTENANCE

 WARNING	Brake Actuators Contain Release without Warning: Brake actuators contain springs and can apply at any time should the applied pneumatic pressure be released or reduced. When working around the brake through the various maintenance procedures it is recommended to have clear work procedures for maintenance tasks. Pneumatic pressure should be locked out through the use of an isolation valve to prevent remote activation.
 WARNING	Maintenance routines and inspection schedules must be followed: Failure to follow the specified maintenance routines can result in failure of brake caliper components. Inspections must be done at scheduled intervals to assess the condition of the brake caliper and its components.

5.1 PREVENTATIVE MAINTENANCE

Maintenance Schedule

Maintenance Item	Daily	Monthly	Annually	5 years
Torque Test	✓			
Inspect for leaks	✓			
Measure air gap		✓		
Determine pad life		✓		
Lubricate pivot pins			✓	
Inspect brake disc			✓	
Check Pivot Block screw preload			✓	
Inspect Brake pins				✓
Service Actuators				✓

5.2 INSPECTION

5.2.1 Pad Wear

The running clearance (air gap) between lining and disc must be maintained within the specified limits. Failure to do so will result in the brake not capable of producing rated torque. When the running clearance has reached .04" [1 mm] the brake must be adjusted back to .01" [.25 mm] per shoe. Refer to [section 5.3.2](#).

The maximum allowable pad life has been reached when the brake pad has worn down to 3/16" [4.8 mm] thick. The lining must be replaced before the shoe lining bolts or rivets start making contact with the brake disc.

5.2.2 Seals

The actuator seals should be inspected on a periodic basis. Soapy water applied to the actuator rod would indicate any seal leakage.

5.2.3 Actuator Test

Occasionally it may be necessary to test the actuator springs as a means of trouble shooting. The easiest method is to measure the hold-off and release pressure of the actuator. The release pressure is defined as the minimum pressure required to fully retract the actuator whereas hold-off pressure is defined as the pressure at which the actuator begins to extend. Both of these pressures give an indication of the condition of the actuator.

To conduct this test a dial indicator or depth micrometer is required as well as a pressure source with a calibrated gauge. The pressure source must have a means of accurately controlling the pressure. Follow these steps to perform the test:

1. Connect the pressure source to the actuator and fully retract the actuator. Be careful not to exceed the MAWP of the actuator.
2. Install the dial indicator to sense the rod stroke and set the dial to zero.
3. Begin reducing the pressure in small increments (5% of rated system pressure) and observe the displacement on the dial indicator.
4. When the dial indicator has moved at least .01" [.25 mm] note the pressure. This is the hold-off pressure. The measured value must be within +/- 5% of the specified value.
5. Continue dropping the pressure to allow the actuator to extend 0.1" [2.5 mm].
6. Begin increasing the pressure in small increments and observe the displacement on the dial indicator.
7. The minimum pressure required to return the actuator rod back to within .01" [.25 mm] is the release pressure. Note this pressure. The measured release pressure must be within +/-5% of the specified value.

5.2.4 Pin Wear

The pivot pins must be removed for inspection once every five years. If there is any evidence of heavy scoring more than .01" [.25 mm] deep or if any area of the pin has been worn down by more than .01" [.25 mm] then replace the pins.

5.2.5 Brake Disc

The brake disc must be inspected periodically to monitor the condition of the braking surface. When the condition of the braking surface has deteriorated to the point that the quality requirements in section 2.2 are no longer met the disc must be removed and resurfaced or replaced. Follow the minimum thickness allowances in the table below as a guideline for when a disc must be replaced.

Table 8: Brake Disc Minimum Thickness Allowances

Brake Disc Minimum Thickness		
Disc Series	Original Thickness in [mm]	Minimum Thickness in [mm]
2-4-XX	2.00 [50.8]	1.90 [48.5]

NOTICE

When re-machining the disc surface, equal amounts must be taken off of each face.

5.2.6 Pivot Block Shoe Preload

It is recommended to check the shoe pivot block screw preload periodically to ensure that the preload on the shoe bolts is not lost. Refer to the maintenance schedule in section 5.1 for the inspection period, refer to section 0 for the recommended preload.

5.3 SERVICE

WARNING

Brake Actuators can Apply without Warning:

Brake actuators contain springs and can apply at any time should the applied pneumatic pressure be released or reduced. When working around the brake through the various service procedures it is recommended to have clear work procedures for maintenance tasks. Pneumatic pressure should be locked out through the use of an isolation valve to prevent remote activation.

5.3.1 Lubrication

Disc brake calipers equipped with spring applied, air released actuators must have a lubricator in the control air system using light hydraulic oil as a lubricant. This is to prevent premature seal wear and reduce seal friction.

All Kobelt calipers, during assembly, are pre-greased on the shoe pin and saddle pin with a Lithium based NLGI 2 grease. These pins must be re-greased no less than once annually.

5.3.2 Stroke Adjustment

On spring applied calipers, the running clearance between the shoe and disc must be maintained within specifications.

DANGER

Failure to maintain the running clearance within the specified limits will not allow the brake to produce adequate torque for the intended duty.

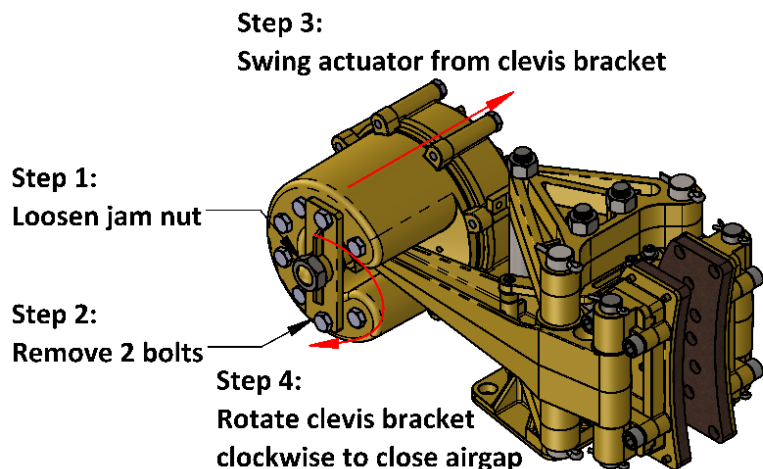
WARNING

Brake Actuators can apply without warning:

Brake actuators contain springs and can apply at any time should the applied pneumatic pressure be released or reduced. When adjusting the stroke, pneumatic pressure should be locked out through the use of an isolation valve to prevent remote activation.

Air Gap Adjustment Procedure:

1. Apply 120 psi of pressure to open the brake & Loosen the clevis jam nut on both actuators.
2. Remove the 2 screws on each clevis bracket.
3. Push the actuator away to separate the actuator assembly from the clevis bracket.
4. Rotate each clevis bracket to desired position (1 full turn = 0.025in [0.7mm] of shoe movement)
5. Reinstall clevis brackets into position, tighten screws



WARNING

Ensure that the valve isolating the brakes is locked out and the pressure securely retained in the brake actuator prior to performing work.

Note:

1. When the spring side clevis has been adjusted to its maximum position, further adjustments may be made to the rod side clevis.
2. When the brake linings are replaced it will be necessary to reset the clevises by turning inward to allow for the extra thickness of a new lining.

5.3.3 Release Limit Switch

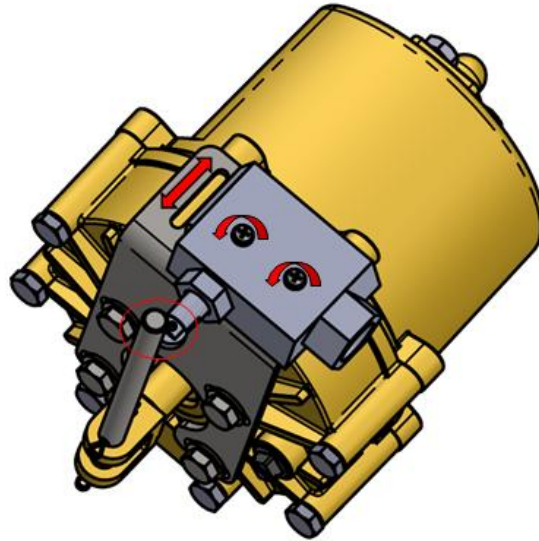
If the brake is equipped with a 6212-MSKIT release indicating limit switch, the switch position must be adjusted after any wear adjustments.

Step 1: Begin by loosening the two mounting screws with a Philips driver and a 5/16" wrench.

Step 2: With the switch loose pressurize the brake to retract the actuator.

Step 3: Slide the switch forward or back until the switch plunger contacts the pin and trips the switch.

Step 4: Retighten the two mounting screws.



5.3.4 Wear Indicating Limit Switch

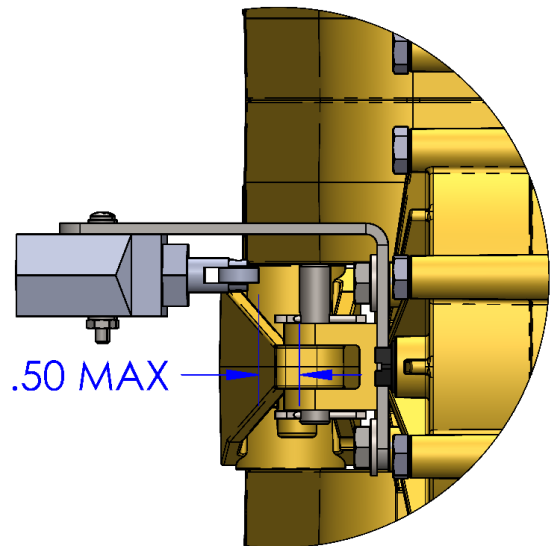
If the brake is equipped with a 6212-WSKIT wear indicating limit switch, the switch position must be adjusted after any wear adjustments.

Step 1: Begin by loosening the two mounting screws with a Philips driver and a 5/16" wrench.

Step 2: With the switch loose pressurize the brake to retract the actuator.

Step 3: Slide the switch back to leave a 1/2" [13mm] maximum gap between the switch plunger and the pin.

Step 4: Retighten the two mounting screws.



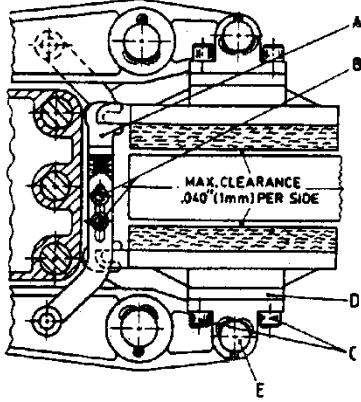
5.3.5 Spring Actuators

If maintenance is required on the spring applied actuator, it must first be removed from the brake assembly. In order to remove the actuator, pressure must be applied to the actuator to release the brake. After removal, the actuator must be retained in a press strong enough to retain the spring tension. The bolts holding both housings can now be removed, and the pressure of the press can be slowly released thus allowing the housings to separate. Clean actuator, replace seals, inspect springs and change parts if necessary. Lubricate all moving parts, re-assemble and re-install actuator in reverse order.

 WARNING	Brake Actuators Contain Compressed Springs: The brake actuators contain springs that are under compression even when the brakes are not pressurized. The springs will release suddenly if disassembled incorrectly posing a risk of serious injury or death. Do not attempt to disassemble the actuators without clear work instructions and training.
--	---

5.3.6 Brake Linings

The linings must be replaced before the rivets make contact with the disc. Remove worn linings from the shoe by drilling out the rivets with a 1/4" drill. Install new linings with the proper rivets.

	LINING REPLACEMENT 1. Remove bottom cotter pins from pins 'E'. 2. Remove pins 'E' by pulling upwards. 3. Remove shoes by sliding radially forward to clear the ends of the levers. When re-installing the shoes into the caliper assembly, be sure to re-engage the balancing links "A". If there is insufficient room radially to remove the shoe, then screws 'C' must be removed.
	BALANCING LINK ADJUSTMENT To adjust; 1. Loosen screws 'B', 2. Apply brakes onto the disc, 3. Ensure link 'A' has no tension on it. Adjust if necessary. 4. Tighten screws 'B'

When reinstalling the shoes and pivot blocks reinstall the shoe pin first to align the pivot blocks before tightening screws 'C'. It is recommended to apply a thread locking compound such as Loctite 243 to the screw threads. Tighten screws 'C' to **140 in-lbs [15.8 Nm]**.

5.3.7 6212-RLKIT Manual Release Kit Installation

Manual actuator release kits are available for purchase for an add on item to the 5021-SA brake. Release kits can be ordered as given in section 5.5. Follow the figures and instructions below to install a release kit onto a 5021-SA caliper.

Table 9: Tools required for installing release kit

Tool/Consumable	Application
1/2in Socket	Release kit mounting bolt installation
Torque wrench, 125 in.lb capacity	
Loctite 243	
Loctite LB 771 Nickel based Anti-Seize	Manual release screw lubrication

Table 10: Technical specifications, release kit installation

Specification	Value
Mounting screw installation torque	125 in-lbs [14.1 Nm]

1. Refer to Figure 3 for arrangement and terminology of the release kit components.
2. Apply Loctite 243 to the threads of the 4X Release kit mounting screws.
3. Insert the mounting screws through the holes in the mounting bracket and into the spacers ensuring the components are oriented as shown in Figure 3.
4. Screw the arranged mounting screws into the holes on the 6212 actuator.
5. Preload the mounting screws to the specified torque given in Table 10.
6. Apply anti-seize to the threads of the release screw and install the jam nut on the release screw. The anti-seize specified in Table 6 must be used.

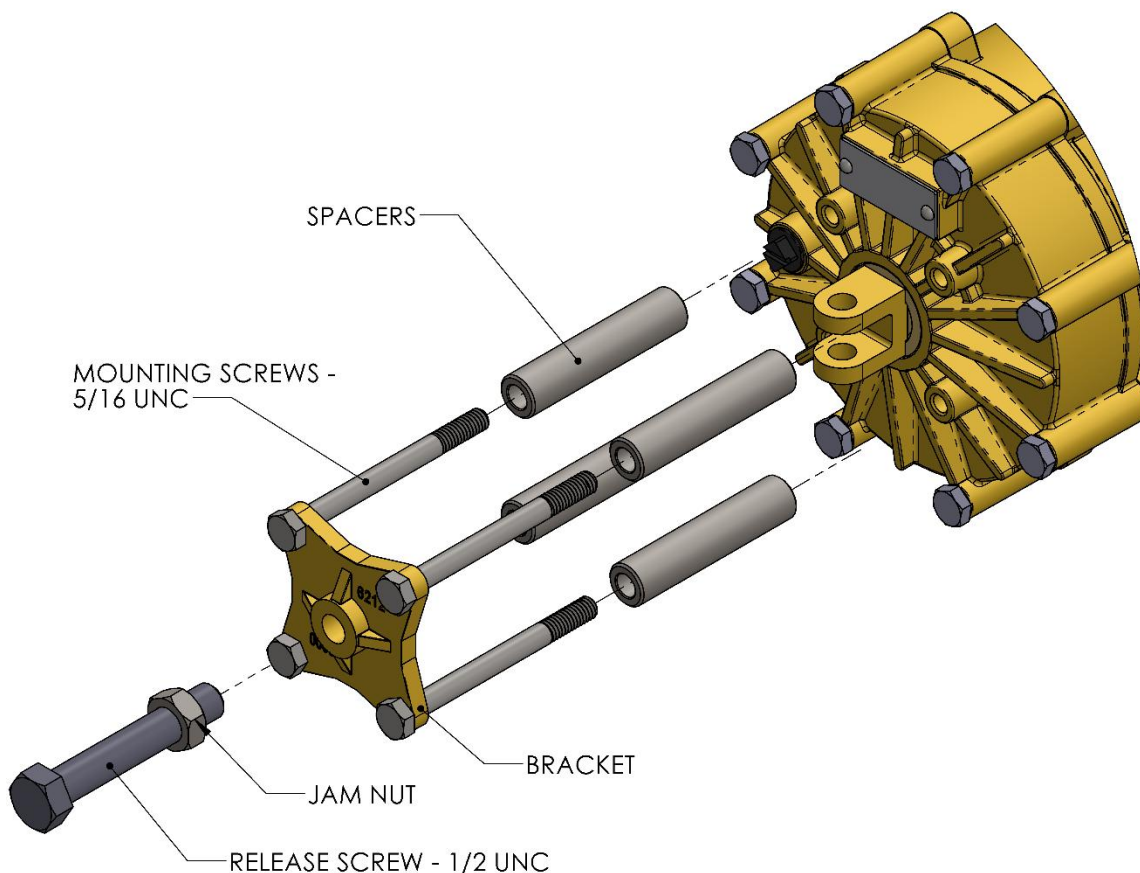


Figure 3: 6212-RLKIT Release Kit Installation

7. Install the release screw into the hole on the bracket and tighten the jam nut to secure the release screw. Ensure the release screw is locked so that the tip of the screw is not beyond the face of the release kit bracket as shown in Figure 4. This will ensure that the actuator can move through its full range of motion. This is considered the 'un-caged' position.
8. The release kit installation is completed, perform a functional check per 3.4 and 3.6 to ensure the installation does not interfere with normal operation of the brake.

⚠ DANGER	The manual release screw must be fully retracted prior to putting the brakes into service. Failure to do so may result in a complete loss of brake torque.
⚠ DANGER	Failure to lock the release screw jam nut in the retracted position can cause the release screw to drift. This may result in a complete loss of torque if the screw advances and interferes with the actuator working stroke.

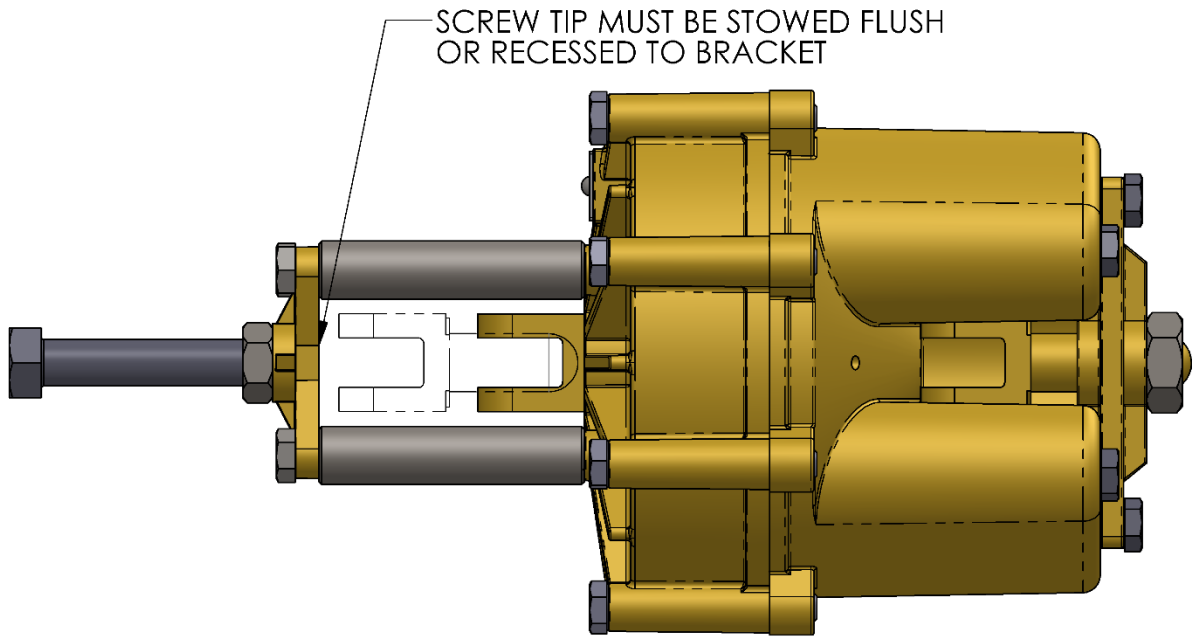


Figure 4: Release screw stow position

5.4 RECOMMENDED SPARES

The spare parts kept on hand will depend on the severity of the service. As a minimum Kobelt recommends keeping the following parts for each brake in service:

1. One Lined set of brake shoes
2. One set of brake pads with rivets
3. One actuator
4. Two seal kits

Refer to the parts list drawings in [Appendix B](#) for a complete list of parts.

The table below itemizes which kit/spare part numbers change with the various brake configuration options. Please reference this table to ensure you receive the correct parts.

Table 11: Configuration Kit Numbers

Configuration Kit Numbers		
Actuator Code	Actuator No.	Description
-SA	6212	102 psi release
-SA90	6212-90	87 psi release
-SA75	6212-75	76 psi release
-SA60	6212-60	62 psi release
Disc Code	Shim Kit	Disc Thickness
-175	5021-1750	1.750 in
-150	5021-1500	1.500 in
-125	5021-1250	1.250 in
-100	5021-1000	1.000 in
Friction Code	Lined Shoe	Friction Material
Blank	5021-LS	Standard
-N	5021-LSN4	non-sparking
-C	5021-LSC4	low COF (.12-.15)
-E	5021-LSE	mid COF (.25-.28)

5.5 ACCESSORIES

Several accessory kits are available for the 5021-SA brake for added functionality. If they were not ordered on the original brake but it is desired to upgrade the brake to include the accessory, they can be ordered as a stand-alone item and installed in the field. Table 12 gives the available accessory kits as well as the equivalent brake model code. Note certain accessories are not compatible, refer to the comment's column on Table 12 for further information.

Table 12: Accessory kits

Accessory Kit			
Kit part number	Description	Equivalent Caliper order code	Comments
6212-RLKIT	Manual release kit	-R	Not compatible with 6212-MSKIT or 6212-WSKIT
6212-MSKIT	Release switch kit	-LS	Not Compatible with 6212-RLIT or 6212-WSKIT
6212-WSKIT	Wear Indicating Switch kit	-WR	Not Compatible with 6212-RLIT or 6212-MSKIT

6 REVISION HISTORY

Table 13: Revision History

Document Revision	Release Date	CO	Author	Revision Summary
B	2026-01-27	01397	GG	• Section 1.5: Add -WS model code • Section 2.2: Added warning about keeping discs free of contaminants • Section 2.3.1: Added caliper mounting bolt specifications. • Section 2.3.4: Added section regarding wear switch • Section 3.1: Added details to caging and advised maximum torque on the release screw. • Section 5.1: Added pivot block screw preload as inspection item. • Section 5.3.5: Revised shoe bolt torque, was 200 lbs-in and recommended Loctite 243 be used. • Unified warnings to Kobelts standard formatting. • Added section 2.3.3 Isolation valves • Added warnings throughout section 5 for working with Spring Applied actuators and using isolation valves during maintenance. • Added section 5.3.6: Release kit Installation • Added section 5.5: Accessories. • Appendix B: Corrected lining part number, was 5021-0147.

7 WARRANTY

Kobelt Manufacturing Co. Ltd. ("Kobelt") warrants the Products and Parts manufactured by Kobelt to be free from defects in workmanship or material and that said products are designed mechanically and functionally to perform to specifications.

This warranty is effective providing:

- The equipment is used within the intended operating conditions and in accordance with Kobelt recommendations
- The equipment is installed according to equipment diagrams, specifications and recommendations which Kobelt has provided

This warranty becomes invalid if the factory supplied serial number has been removed or altered on the product. This warranty does not cover cosmetic damage or damage caused by an act of God, accident, misuse, abuse, negligence or modification of any part of the product. This warranty does not cover damage due to improper operation or maintenance, connection to inappropriate equipment or attempted repair by anyone other than an authorized Kobelt representative.

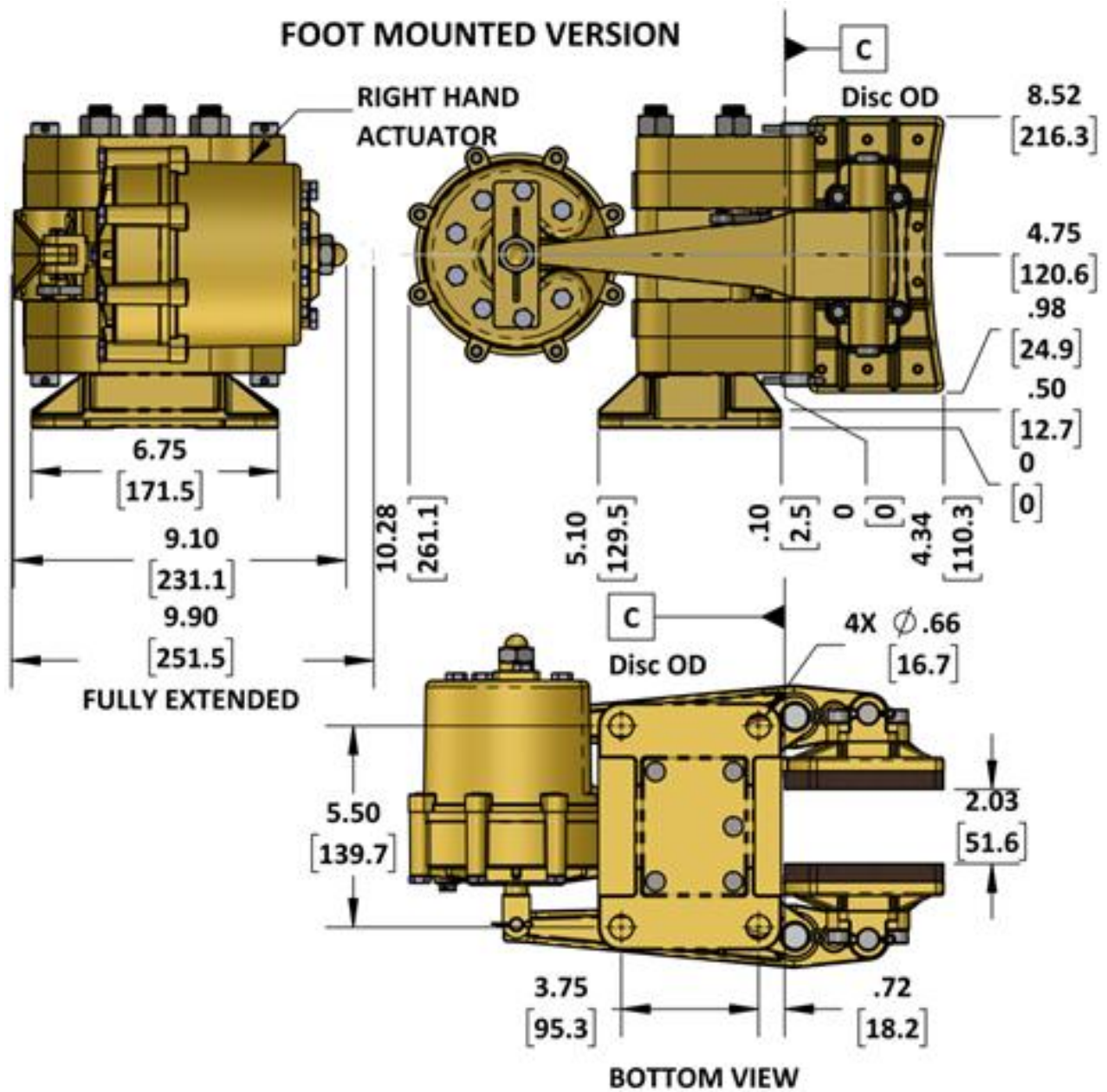
Upon identification of a potential issue or defect with a Kobelt Product or Part, the Warranty Applicant ("Applicant") must immediately contact Kobelt and describe the issue in writing, by letter, fax, email or other electronic conveyance. Kobelt will then assess the cause of the defect, and determine warranty applicability and appropriate remediation.

If any part is found to be defective, Kobelt will replace said part FOB the Kobelt factory provided that any such defective part is returned by the Buyer with freight and applicable forwarding charges prepaid by the Buyer. Kobelt's sole obligation to the Applicant will be to repair or replace the defective part with same or similar product, to a maximum value of the list price of the product or part. The Kobelt warranty does not cover labour charges, travel or any other associated expenses.

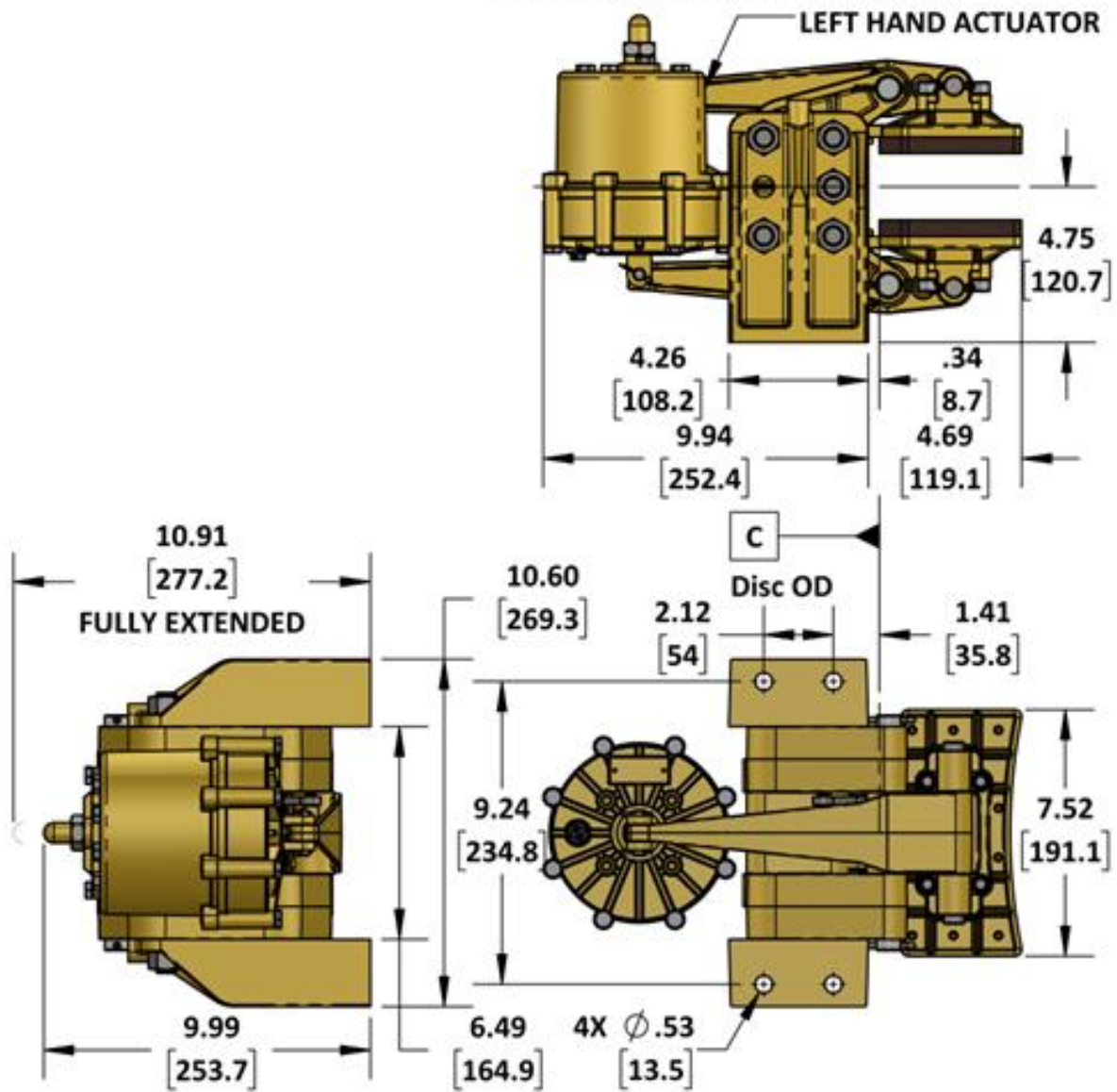
All Products and Parts manufactured by Kobelt, with the exception of brake discs and pads, are subject to a warranty against manufacturer's defects in materials or workmanship for a period of two (2) years from the date of purchase. Brake discs are subject to a one (1) year warranty period, and brake pads and linings are not covered by warranty.

Kobelt will be responsible for all Products or Parts sold by Kobelt but manufactured by 3rd party manufacturing companies. However, these products and parts are subject to applicable 3rd party warranties, and may not be the same as the Kobelt warranty.

8 APPENDIX A: TECHNICAL DRAWINGS



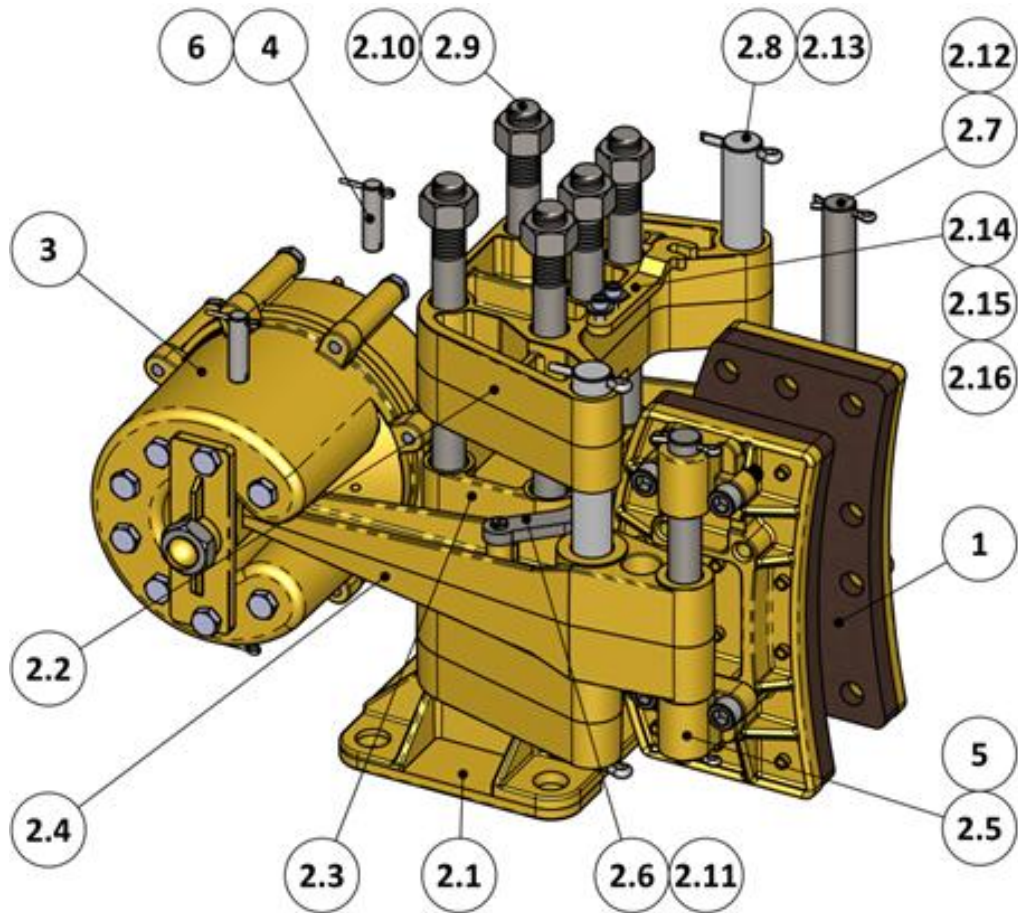
SIDE MOUNTED VERSION



9 APPENDIX B: PARTS LIST DRAWINGS

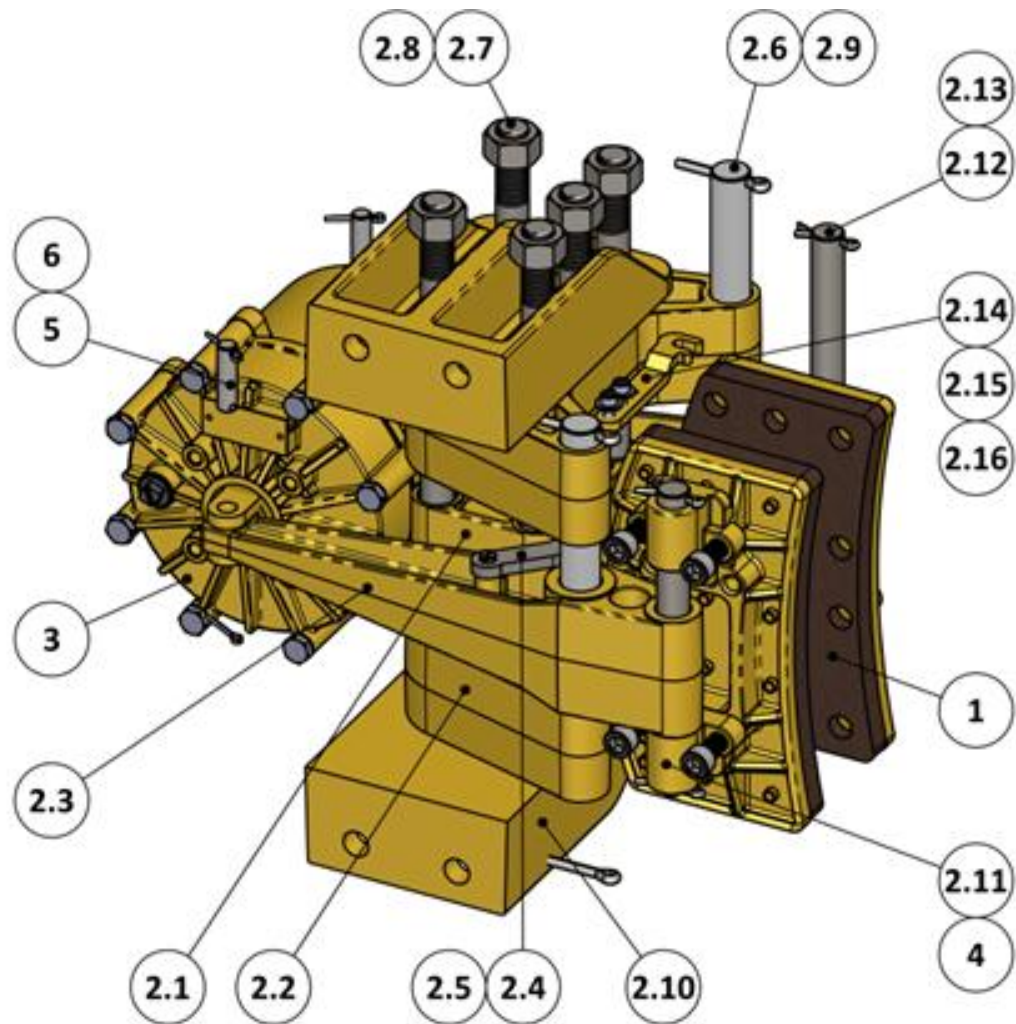
Note: Parts lists given in Appendix B are applicable for standard models only.

5021-SA



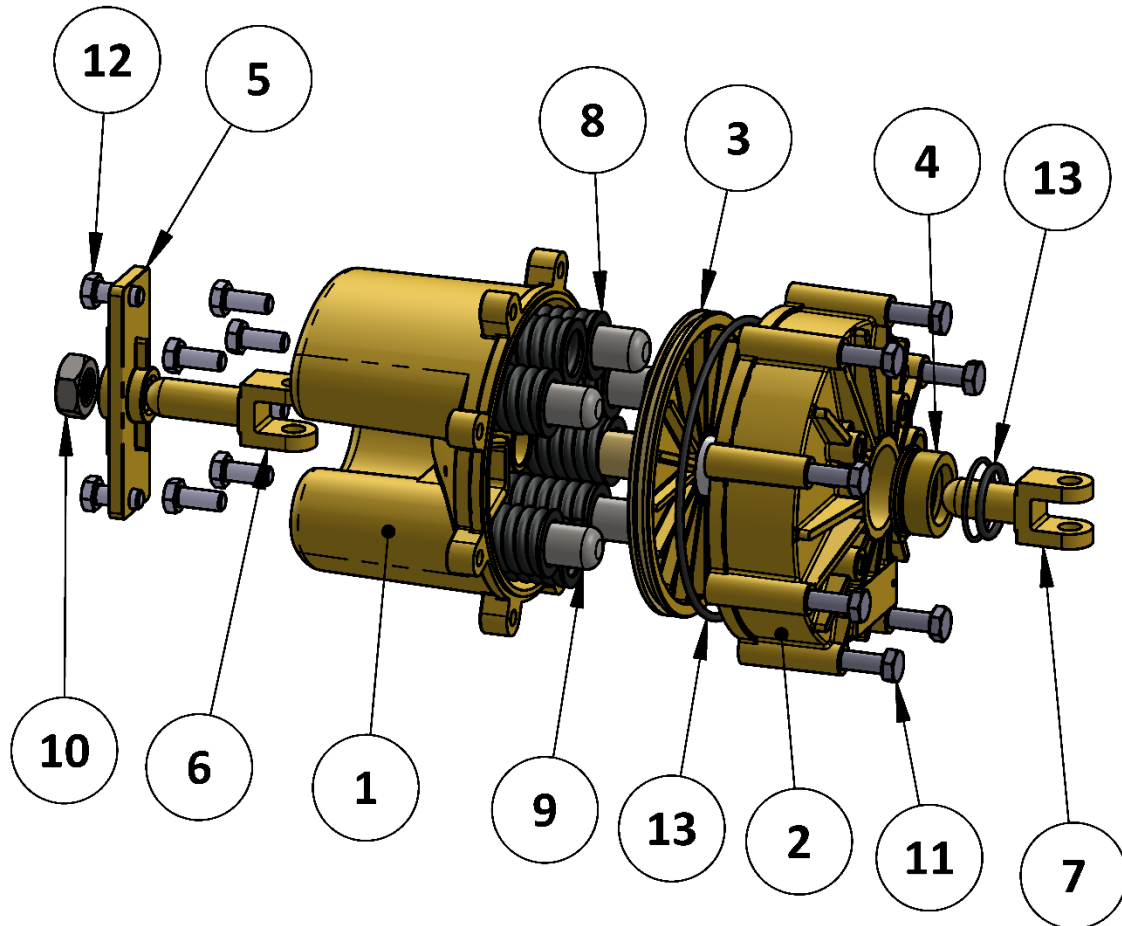
ITEM	QTY.	PART NUMBER	DESCRIPTION
1	2	5021-LS	SHOE ASSEMBLY, 5021 CALIPER, 1/2" K5
2	1	5021-SUB	SUB-ASSEMBLY, 5021 CALIPER
2.1	1	5021-0001	FOOT
2.2	2	5021-0002	SADDLE, 5021 CALIPER
2.3	1	5021-0003	SPACER, 5021 CALIPER
2.4	2	5021-0004	LEVER, 5021 CALIPER
2.5	4	5021-0006	HINGE BLOCK
2.6	2	5021-0011	BALANCING LINK PART 1 5021 CALIPER
2.7	2	5021-0021	SHOE PIN 5021 CALIPER
2.8	2	5021-0022	SADDLE PIN 5021 CALIPER
2.9	5	5021-0023	TIE ROD
2.10	5	1022-0116	HEX NUT - REGULAR; 5/8-11 UNC GR 18-8
2.11	2	5021-0226	LINK PIN 5/16 UNC X 7/8 LG
2.12	4	1026-0516	COTTER PIN; 1/8 DIA X 1 LG. 18-8
2.13	4	1026-0820	COTTER PIN; 3/16 DIA x 1 1/4 LG, 18-8
2.14	2	5021-0012	BALANCE LINK NO. 2 5021 CALIPER
2.15	4	1002-0808	SCREW, SKT HEAD, 10-24 X 1/2, 18-8 SS, ASTM F837
2.16	4	1023-0108	WASHER FLAT #10 TYPE A SS
3	1	6212	SPRING APPLIED ACTUATOR, 6212
4	2	6112-0010-L	PIN, LONG, 6112 ACTUATOR
5	8	1002-1216	SCREW, SKT HD CAP, 3/8-16 UNC X 1, SS
6	4	1026-0312	COTTER PIN 3/32 X 3/4 SS

5021-SAW



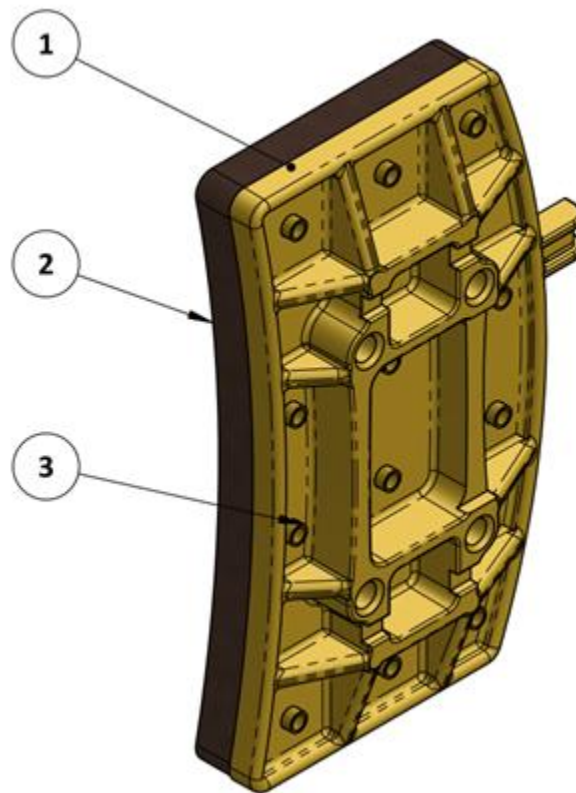
ITEM	QTY.	PART NUMBER	DESCRIPTION
1	2	5021-LS	SHOE ASSEMBLY, 5021 CALIPER, 1/2" K5
2	1	5021-SUB-W	SIDE MOUNT SUB-ASSEMBLY, 5021 CALIPER
2.1	1	5021-0003	SPACER, 5021 CALIPER
2.2	2	5021-0002	SADDLE, 5021 CALIPER
2.3	2	5021-0004	LEVER, 5021 CALIPER
2.4	2	5021-0011	BALANCING LINK PART 1 5021 CALIPER
2.5	2	5021-0226	LINK PIN 5/16 UNC X 7/8 LG
2.6	2	5021-0022	SADDLE PIN 5021 CALIPER
2.7	5	5021-0023	TIE ROD
2.8	10	1022-0116	HEX NUT - REGULAR; 5/8-11 UNC GR 18-8
2.9	4	1026-0824	COTTER PIN, 3/16 x 1 1/2, 18-8
2.10	2	5021-0101	SIDE MOUNT BRACKET, 5021 CALIPER
2.11	4	5021-0006	HINGE BLOCK
2.12	2	5021-0021	SHOE PIN 5021 CALIPER
2.13	4	1026-0516	COTTER PIN; 1/8 DIA X 1 LG. 18-8
2.14	2	5021-0012	BALANCE LINK NO. 2 5021 CALIPER
2.15	4	1002-0808	SCREW, SKT HEAD, 10-24 X 1/2, 18-8 SS, ASTM F837
2.16	4	1023-0108	WASHER FLAT #10 TYPE A SS
3	1	6212	SPRING APPLIED ACTUATOR, 6212
4	8	1002-1216	SCREW, SKT HD CAP, 3/8-16 UNC X 1, SS
5	2	6112-0010-L	PIN, LONG, 6112 ACTUATOR
6	4	1026-0312	COTTER PIN 3/32 X 3/4 SS

6212 Actuator



ITEM	QTY.	PART NUMBER	DESCRIPTION
1	1	6212-0001	SPRING HOUSING
2	1	6212-0002	CYLINDER HEAD
3	1	6212-0003-K	PISTON, CHROMED
4	1	6212-PHB	ROD BUSHING
5	1	6212-0004	CLEVIS BRACKET
6	1	6212-0005-L	CLEVIS, LONG, 5/8 UNC X 3/8 PIN
7	1	6212-0005-S	CLEVIS, SHORT, 5/8 UNC X 3/8 PIN
8	8	1201-0035	COMPRESSION SPRING; HEAVY
9	6	6212-0016	SPRING GUIDE; HEAVY
10	1	1022-0216	JAM NUT; 5/8-11, 18-8
11	8	1001-1136	SCREW, HX HD CAP, 5/16-18 X 2-1/4, 18-8
12	8	1001-1112	SCREW HEX HEAD, 5/16-18 x 3/4, 18-8
13	1	6212-RK	SEAL KIT, 6212 ACTUATOR

5021-LS



ITEM	QTY.	PART NUMBER	DESCRIPTION
1	1	5021-0005	SHOE 5021 CALIPER
2	1	5021-0007	BRAKE PAD, 5/16 K5
3	12	1033-1007	RIVET, 1/4 X 7/16 (10-7), BRASS



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