



## **5020-M Series Disk Brakes**

***Manually Applied Version***

***Owner's Operation, Installation &  
Maintenance Manual***



Kobelt Manufacturing Co. Ltd.

NOTES:

| RECORD DATA BEFORE INSTALLATION FOR FUTURE REFERENCE |  |
|--|--|
| Model #:   |  |
| Serial #:  |  |
| Date of Purchase:                                    |  |
| Date of Installation:                                |  |

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# 1 INTRODUCTION

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## 1.1 CONTACT

**Kobelt Manufacturing Co. Ltd.**  
8238 129th Street  
Surrey, British Columbia  
Canada, V3W 0A6

Sales Tel: +1-604-572-3935  
Fax: +1-604-590-8313  
Email: [sales@kobelt.com](mailto:sales@kobelt.com)  
Website: [www.kobelt.com](http://www.kobelt.com)




This document is intended to clearly present comprehensive product data and provide technical information to assist the end user in design applications. Kobelt reserves the right, without notice, to change the design, or construction, of any products and to discontinue or limit distribution of any products. Kobelt also reserves the right to change, or update, without notice, any technical information contained within this document.

Kobelt recommends that customers visit our website to check for updates to this Manual. Once a product has been selected for use, it should be tested by the user to ensure proper function in all possible applications. For further instructions, please contact our distributors or visit our website.

## 1.2 SAFETY

### 1.2.1 Safety Alerts

Throughout this manual, the following symbols, and their accompanying explanation, are used to alert the user to special instructions concerning a service or operation that may be hazardous if performed incorrectly or carelessly. The associated risk levels are stated below.

|  |   |
|--|---|
|  <b>DANGER</b>   | This symbol indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.                |
|  <b>WARNING</b> | This symbol indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.               |
|  <b>CAUTION</b> | This symbol indicates a hazardous situation, which if not avoided, could result in minor or moderate injury.                          |
| <b>NOTICE</b>  | This symbol informs the reader of events not related to personal injury but which there is a risk of damage to property or equipment. |
| <b>SAFETY INSTRUCTIONS</b>   | This symbol informs the reader of safety-related instructions or procedures.  |

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### 1.2.2 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.

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### 1.2.3 Product Hazards



#### WARNING

**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.



#### WARNING

**Pinch Points:** Brakes contain numerous pinch points which can cause serious injury. Ensure all power sources are locked out prior to performing work.



#### 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.

#### SAFETY INSTRUCTIONS

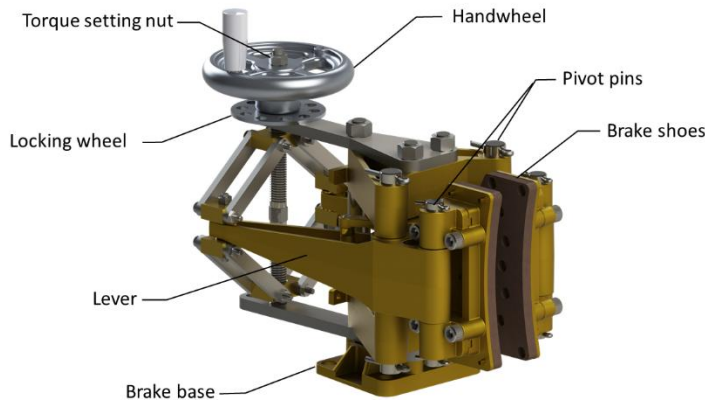
**Airborne Dust:** Brake linings contain fibers that may become airborne during cutting or sanding operations. Over exposure to these dusts should be considered hazardous. Use NIOSH approved respirators when working with brake linings. Request a MSDS for further information.

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## 2 PRODUCT DESCRIPTION

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The diagram below shows a typical Kobelt caliper brake with all the major components identified.



*Figure 1: Caliper Brake Nomenclature*

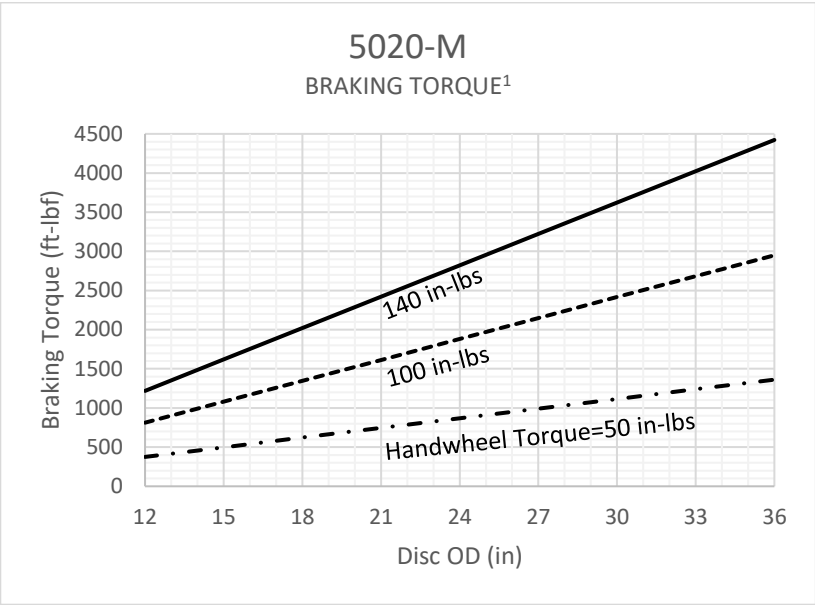
### 2.1 TECHNICAL DATA

#### BRAKE SPECIFICATIONS

|                             |                        |                  |
|-----------------------------|------------------------|------------------|
| Normal Force <sup>1</sup> : | 0 ...4550 lbs          | [20.2 KN]        |
| Temperature Range:          | -55°F ...+120°F        | [-48°C ...+49°C] |
| Disc Thickness:             | 1¼ in                  | [32 mm]          |
| Minimum Disc Diameter:      | 12 in                  | [229 mm]         |
| Maximum Disc Diameter:      | unlimited <sup>2</sup> |                  |
| Weight:                     | 33 lbs                 | [14.8 kg]        |

#### SWITCH SPECIFICATIONS

|                      |                        |                  |
|----------------------|------------------------|------------------|
| Type:                | inductive sensor (PNP) |                  |
| Output:              | normally open          |                  |
| Voltage:             | 10...30 VDC            |                  |
| Current consumption: | 15 mA                  |                  |
| Switching output:    | 200 mA                 |                  |
| Switching frequency: | 800 hz                 |                  |
| Temperature Range:   | -13°F ...+120°F        | [-25°C ...+49°C] |
| Protection:          | IP65                   |                  |



- 1) Values in this chart are theoretical and for reference only. They are based on properly bedded and burnished linings acting on a rotor at 20°C and manufactured to required specifications.
- 2) Requires a minimum 2.80 in [71 mm] wide face

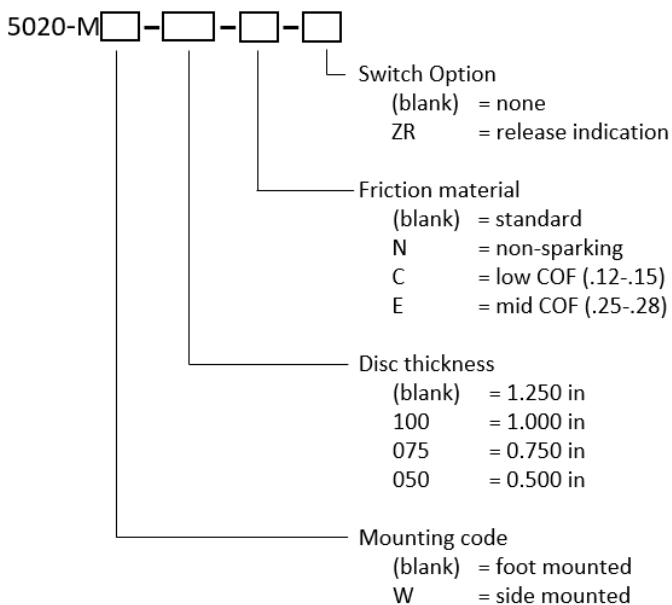
For further technical data and specifications refer to the relevant datasheets from [www.kobelt.com](http://www.kobelt.com) or the technical drawings in Appendix A if provided.



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## 2.2 MODEL CODE KEY

### Brake Model Code Key



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# 3 INSTALLATION

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## 3.1 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.

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 bake actuators plus full pad wear adjustment.

## 3.2 BRAKE DISCS

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

Table 1: Brake Disc Requirements

| PARAMETER        | VALUE                                 |
|------------------|---------------------------------------|
| AXIAL RUN OUT    | IT9 (TIR) <sup>①</sup>                |
| RADIAL RUN OUT   | IT11 (TIR) <sup>①</sup>               |
| FLATNESS         | .003 in [0.08 mm] <sup>②</sup>        |
| PILOT FIT        | H9/f8                                 |
| SURFACE FINISH   | 63 micro inches [1.6 micrometers] RMS |
| SURFACE HARDNESS | HB135 minimum                         |

To achieve the run-out 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.

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<sup>①</sup>International tolerance class. Allowable run out is proportional disc O.D.





<sup>②</sup>Per 2.5 in [64 mm] square area

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 2: 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 [0.5] |
| 15 [381]                       | 0.016 [0.4]                       | 0.021 [0.5] | 0.026 [0.7] | 0.031 [0.8] |
| 20 [508]                       | 0.022 [0.6]                       | 0.028 [0.7] | 0.035 [0.9] | 0.041 [1.0] |
| 25 [635]                       | 0.027 [0.7]                       | 0.035 [0.9] | 0.043 [1.1] | 0.051 [1.3] |
| 30 [762]                       | 0.032 [0.8]                       | 0.042 [1.1] | 0.052 [1.3] | 0.062 [1.5] |
| 35 [889]                       | 0.038 [1.0]                       | 0.049 [1.2] | 0.061 [1.5] | 0.072 [1.8] |
| 40 [1016]                      | 0.043 [1.1]                       | 0.056 [1.4] | 0.069 [1.8] | 0.082 [2.1] |

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.

|  |  |
|--|--|
|  <b>WARNING</b>   | Do not use fitted bolts for installing brake discs. The bolt holes must be over sized to permit uninhibited expansion.   |
|  <b>WARNING</b>   | Do not secure a brake disc to a rotating element by welding.   |
|  <b>WARNING</b> | Do not paint the cooling fins of a ventilated disc. The cooling efficiency will be compromised, and overheating may result.  |
|  <b>WARNING</b> | <b>Keep Discs free from contaminants:</b><br>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. |

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

## 3.3 CALIPER BRAKES

### 3.3.1 Mechanical

Perform the following steps to properly install a caliper brake:

1. Lower the brake onto the brake pedestal and center over the mounting holes.
2. 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.

3. 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.
4. Manually apply the brake onto the disc. The brake shoes will naturally align with the disc.
5. Probe under the brake base with feeler gauges to determine the shimming requirement.
6. Manually release the brake again and lift the brake up approximately two inches.
7. Insert the shims determined from step 6. Use ANSI shims that straddle the mounting bolts.
8. 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: 1/2-13 UNC
  - b. Bolt grade: SAE J429, grade 5
  - c. Thread locker: Loctite® 243
  - d. Tightening torque: 57 ft-lbf [77 Nm]

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### 3.3.2 Instrumentation

Kobelt caliper disc brakes may be equipped with a release indicating proximity switch (part number **6001-3711**). The connection to the switch must be made with a 3 pin – M8 cable.

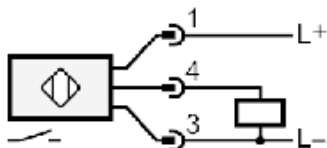
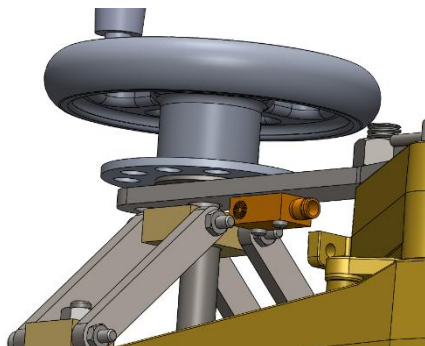


Figure 2: Connection Diagram



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## 4 COMMISSIONING

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### 4.1 AIR GAP

The running clearance between the pads and disc is factory set and not adjustable. As a check prior to putting the brakes into service, ensure that the airgap between the brake pads and disc when the brakes are released is at least 0.01" [0.25 mm] per shoe.

If the pads have worn excessively (0.25 inches [6.4 mm] or more per side), the shoes can be shimmed with a 5020-0750 shim kit.

### 4.2 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 that all bolts are tight and cotter pins are in place.
6. Cycle the brakes and ensure that the brakes are operational (reference section 5.2 for operating the brake).

### 4.3 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.

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Reference section 5.2 for instructions on manually operating the brake.



## **WARNING**

Disc temperature must not exceed 700°F (371°C) or permanent degradation of the lining may occur.

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:

- Partially applying the brake to a level that the drive can tolerate, or
- 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:

1. The temperature of the disc must be closely monitored. Excessive heat will damage the friction linings.
2. The duration of burnishing varies with each application.
3. 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.

## **4.4 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.

Reference [section 5.2](#) for setting brake torque.

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## 5 OPERATION

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### 5.1 SERVICE LIMITS

#### 5.1.1 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.

#### 5.1.2 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 120°C [248°F]

#### 5.1.3 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.

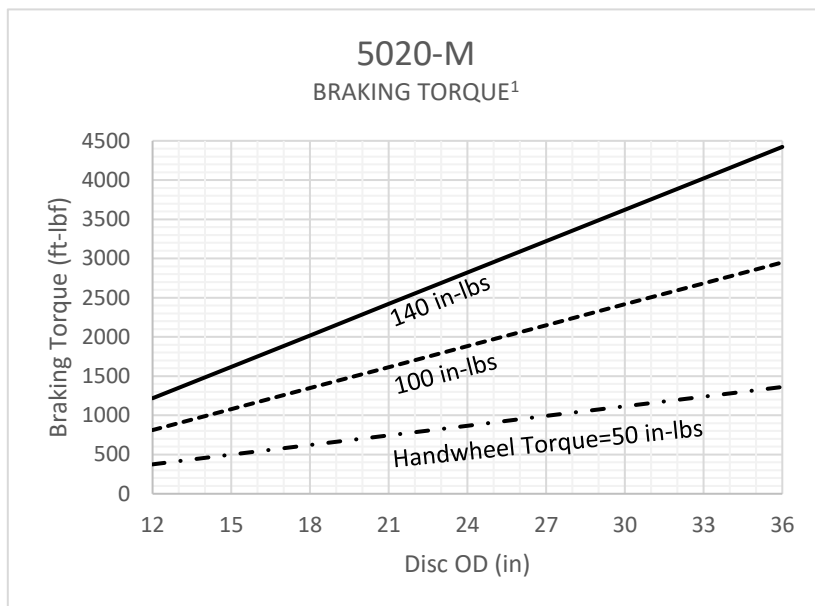
*Table 3: Maximum Disc Speeds*

| Part Number<br>1.25" x 2.5" Series | Nominal OD |     | Max. Speed      |          |
|------------------------------------|------------|-----|-----------------|----------|
|                                    | inch       | mm  | Standard<br>rpm | Balanced |
| 1.25-2.5-12                        | 12         | 307 | 2140            | 4600     |
| 1.25-2.5-15                        | 15         | 385 | 1610            | 3650     |
| 1.25-2.5-18                        | 18         | 457 | 1290            | 3000     |
| 1.25-2.5-21                        | 21         | 536 | 1090            | 2550     |
| 1.25-2.5-24                        | 24         | 612 | 940             | 2250     |
| 1.25-2.5-27                        | 27         | 688 | 820             | 1980     |
| 1.25-2.5-30                        | 30         | 762 | 730             | 1780     |



## 5.2 MANUAL OPERATION

To apply the brake, turn the handwheel clockwise until the pads contact the disc. Then, using a torque wrench acting on the torque setting nut and the chart below as a reference, set the desired brake torque by applying the correct amount of torque to the handwheel.

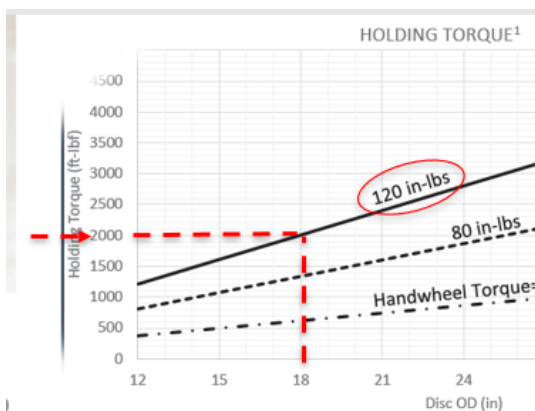


1) Values in this chart are theoretical and for reference only. They are based on properly bedded and burnished linings acting on a rotor at 20°C and manufactured to required specifications.

For example:

To generate 2000 ft-lbs of torque in order to safely lock a fan against drafts;


1. Look up the desired torque level on the vertical axis of the chart
2. Locate the disc size on the horizontal axis of the chart
3. Read the required input torque from where the two lines intersect.



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# 6 MAINTENANCE

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 **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 asses the condition of the brake caliper and its components.

## 6.1 PREVENTATIVE MAINTENANCE

| Maintenance Item                | Monthly | Annually | 5 Years |
|---------------------------------|---------|----------|---------|
| Measure air gap                 | ✓       |          |         |
| Determine pad life              | ✓       |          |         |
| Lubricate Pivot pins            |         | ✓        |         |
| Inspect brake disc              |         | ✓        |         |
| Torque Test                     |         | ✓        |         |
| Check Pivot Block Screw preload |         | ✓        |         |
| Inspect Brake Pins              |         |          | ✓       |

## 6.2 INSPECTION

### 6.2.1 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 sluggish brake response and excessive air consumption. When the running clearance has reached 0.04" [1 mm] the brake must be adjusted back to 0.01" [0.25 mm] per shoe. Refer to section 5.3.2.

For pressure applied brakes maintain the proper running clearance between the shoe and the disc to ensure fast response and minimize the air consumption.

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.

### 6.2.2 Pin Wear

The pivot pins must be removed for inspection once every five years. If there is any evidence of heavy scoring more than 0.01" [0.25 mm] deep or if any area of the pin has been worn down by more than 0.01" [0.25 mm] then replace the pins.

### 6.2.3 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 3.2](#) 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 4: Brake Disc Minimum Thickness Allowances

| Brake Disc Minimum Thickness |                            |                           |
|------------------------------|----------------------------|---------------------------|
| Disc Series                  | Original Thickness in [mm] | Minimum Thickness in [mm] |
| 1.25-2.5-XX                  | 1.25 [31.8]                | 1.18 [30.0]               |

## NOTICE

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

### 6.2.4 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 6.1 for the inspection period, refer to section 6.3.2 for the recommended preload.

## 6.3 SERVICE

### 6.3.1 Lubrication

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.

### 6.3.2 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 ¼" drill. Install new linings with the proper rivets.

### 6.3.2.1 Lining Replacement

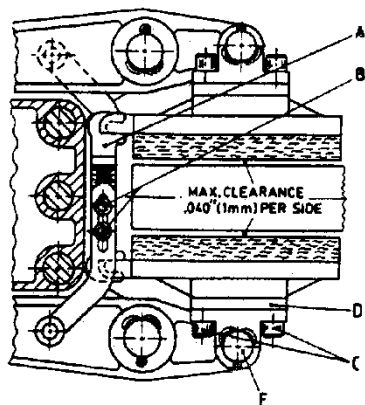


Figure 3: Lining Replacement Reference Diagram

Follow the following steps to replace the lining:

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.

### 6.3.2.2 Balancing Link Adjustment

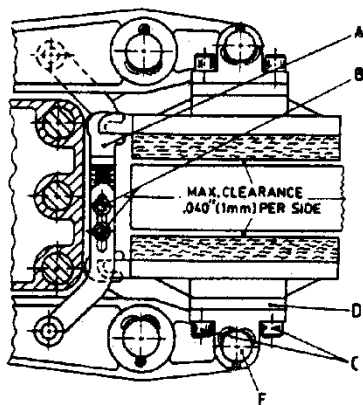


Figure 4: Balancing Link Adjustment Reference Diagram

To adjust:

1. Loosen screws 'B',
2. Apply brakes onto the disc,
3. Ensure link 'A' has no tension on it. Adjust if necessary.

### 6.3.2.3 Reinstalling the Shoes and Pivot Blocks

When reinstalling the shoes and pivot blocks reinstall the shoe pin first to align the pivot blocks before tightening screws 'C'. Tighten screws 'C' to the value given in the table below.

Table 5: Pivot Block Screw Torque

| Caliper Model | Bolt Size | Torque               |
|---------------|-----------|----------------------|
| 5020          | 3/8 UNC   | 140 in-lbs [15.8 Nm] |

## 6.4 RECOMMENDED SPARE PARTS

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

When purchasing replacement parts refer to Appendix B: Parts List at the back of this manual for Kobelt component Part Numbers.

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**NOTICE**

It is recommended that any required service work on a Kobelt unit be performed by a factory authorized service representative. Please contact the nearest Kobelt authorized distributor for assistance.

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 6: Configuration Kit Numbers*

| Configuration Kit Numbers |            |                   |
|---------------------------|------------|-------------------|
| Disc Code                 | Shim Kit   | Disc Thickness    |
| -100                      | 5020-1000  | 1.000 in          |
| -075                      | 5020-0750  | 0.750 in          |
| -050                      | 5020-0050  | 0.50 in           |
| Friction Code             | Lined Shoe | Friction Material |
| -N                        | 5020-LSN   | non-sparking      |
| -C                        | 5020-LSC   | low COF (.12-.15) |
| -E                        | 5020-LSE   | mid COF (.25-.28) |

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# 7 TROUBLESHOOTING

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If you encounter problems with the operation of your product, please refer to the troubleshooting suggestions before contacting Kobelt for assistance. If the steps below do not resolve your issue, please reach out either Kobelt directly or our Dealers in your area.

Table 7: Common Solutions

| Problem<br>(Issue encountered) | Cause<br>(What it means) | Corrective Action<br>(What to do) |
|--------------------------------|--------------------------|-----------------------------------|
|                                |                          |                                   |
|                                |                          |                                   |

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# 8 REVISION HISTORY

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| Document Revision | Release Date | CO    | Author | Revision Summary   |
|-------------------|--------------|-------|--------|--|
| C                 | 2026-02-18   | 01411 | GG     | <ul style="list-style-type: none"><li>• Section 3.2: Added warning to keep brake discs free of contaminants.</li><li>• Section 3.3: Added bolt mounting bolt properties</li><li>• Section 6.1: Reformatted maintenance schedule to standard table. Added checking shoe bolt preload to annual inspection.</li><li>• Added section 6.2.4 checking shoe bolt preload</li><li>• Section 6.3.2: Revised shoe bolt torque, was 200in.lbs</li><li>• Section 6.4: Corrected shim kit part numbers and descriptions, was referencing 5026 brake.</li></ul> |



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## 9 WARRANTY

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Kobel Manufacturing Co. Ltd. ("Kobel") 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.

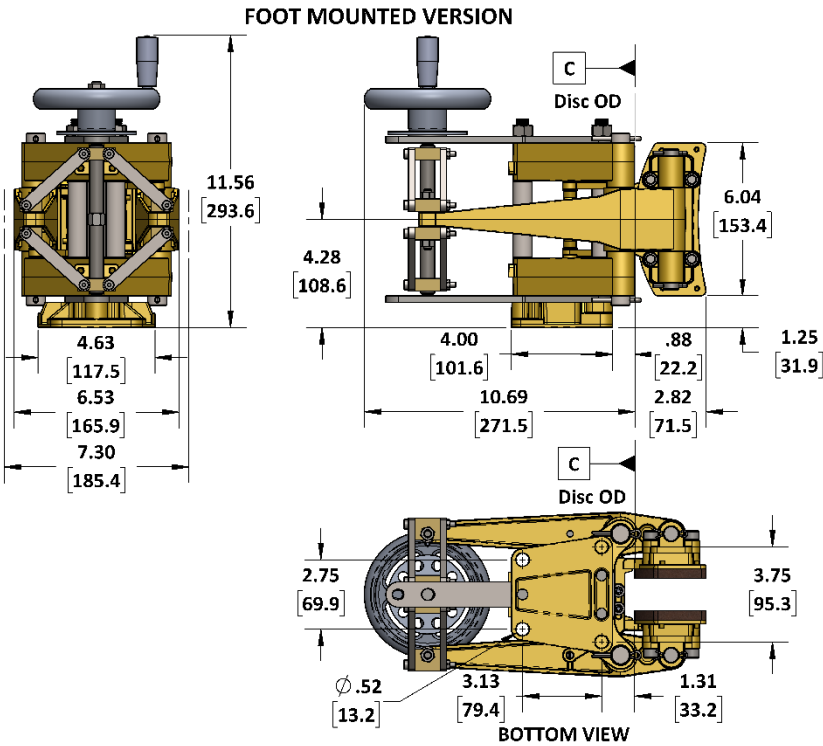
Upon identification of a potential issue or defect with a Kobelt Product or Part, the Warranty Applicant ("Applicant") must immediately contact Kobelt and describe the issue in writing, by letter, fax, email or other electronic conveyance. Kobelt will then assess the cause of the defect, and determine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

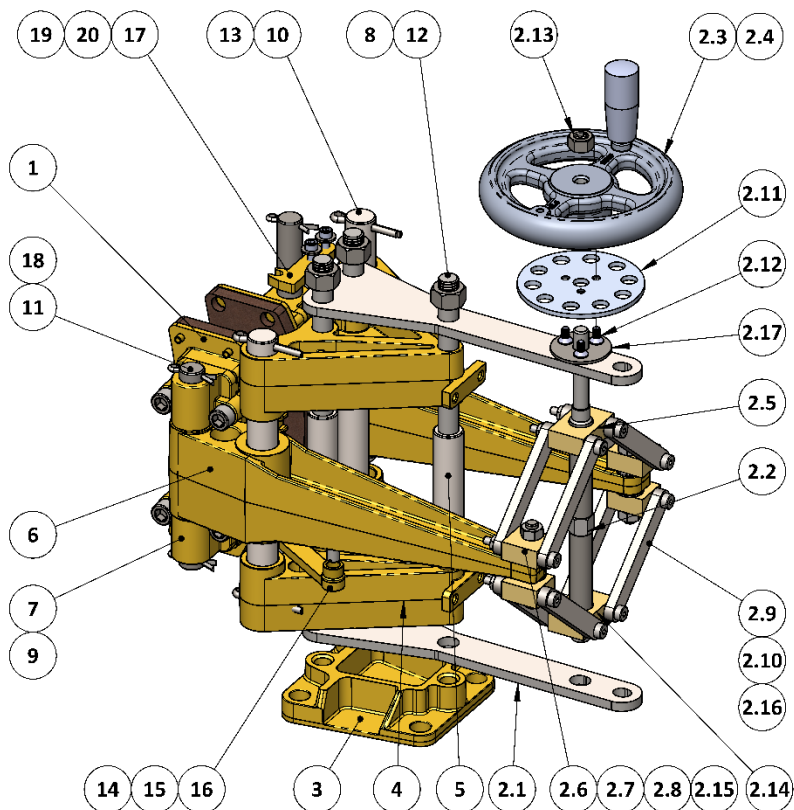
All Products and Parts manufactured by Kobelt, with the exception of brake discs and pads, are subject to a warranty against manufacturer's defects in materials or workmanship for a period of two (2) years from the date of purchase. Brake discs are subject to a one (1) year warranty period, and brake 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.

# 10 APPENDIX A: TECHNICAL DRAWINGS

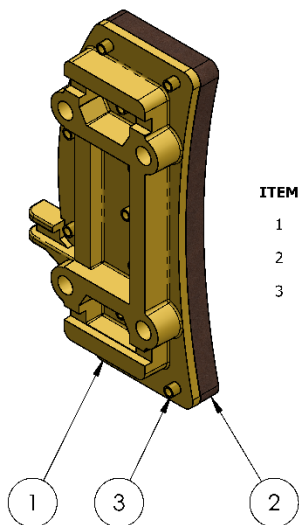


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| ITEM | QTY. | PART NUMBER  | DESCRIPTION                             |
|------|------|--------------|---|
| 1    | 2    | 5020-LS      | SHOE ASSEMBLY, 3/8IN K5                 |
| 2    | 1    | 5020-M-SUB   | HANDWHEEL SUB-ASSEMBLY                  |
| 2.1  | 2    | 5020-0040    | BASE 5020-M                             |
| 2.2  | 1    | 5020-0041    | TURNBUCKLE ROD 5020-M                   |
| 2.3  | 1    | 9899-0046-01 | HAND WHEEL 5IN ALUMINUM MODIFIED        |
| 2.4  | 1    | 1051-0001    | HANDLE REVOLVING SQUARE 1/4-20 SS       |
| 2.5  | 1    | 5020-0042-L  | BLOCK, TRAVELING, LEFT HAND THREAD      |
| 2.6  | 4    | 5020-0043    | REACTION BLOCK 5020-M                   |
| 2.7  | 2    | 5020-0044    | REACTION BLOCK PIN 5020-M               |
| 2.8  | 4    | 1022-0111    | NUT, HEX, 5/16-18, 18-8 SS              |
| 2.9  | 8    | 5020-0045    | LINK, 5020 HAND WHEEL BRAKE             |
| 2.1  | 8    | 1019-0424    | SCREW, SHOULDER 1/4 x 1-1/2, 18-8       |
| 2.11 | 1    | 5020-0046    | LOCKOUT PLATE 5020-M                    |
| 2.12 | 3    | 1015-0806    | SCREW, SKT, FLT HD, #10-24 x 3/8, 18-8  |
| 2.13 | 1    | 1022-0112    | NUT, HEX, 3/8-16, 18-8 SS               |
| 2.14 | 1    | 5020-0042    | TRAVELING BLOCK 5020-M                  |
| 2.15 | 4    | 1023-0111    | WASHER FLAT 5/16 X .687 X 1/16 18-8     |
| 2.16 | 8    | 1022-0108    | NUT, HEX, #10-24, GR 18-8               |
| 2.17 | 1    | 1023-0245    | WASHER, FENDER, 3/8 X 1-1/2, 18-8 SS    |
| 3    | 1    | 5020-0001    | BASE, 5020 CALIPER                      |
| 4    | 2    | 5020-0002    | SADDLE, 5020 CALIPER                    |
| 5    | 3    | 5020-0003    | SPACER, 5020 CALIPER                    |
| 6    | 2    | 5021-0004    | LEVER, 5021 CALIPER                     |
| 7    | 4    | 5021-0006    | HINGE BLOCK                             |
| 8    | 3    | 1022-0114    | NUT, HEX, 1/2 X 13, 18-8 SS             |
| 9    | 8    | 1002-1216    | SCREW, SKT HD CAP, 3/8-16 UNC X 1, SS   |
| 10   | 2    | 5020-0022    | SADDLE PIN, 5020 CALIPER                |
| 11   | 2    | 5021-0021    | SHOE PIN 5021 CALIPER                   |
| 12   | 3    | 5020-0023-W  | TIE ROD, 5020 SIDE MOUNT CALIPER        |
| 13   | 4    | 1026-0824    | COTTER PIN, 3/16 x 1 1/2, 18-8          |
| 14   | 2    | 5021-0126    | LINK PIN, LONG, 5020 CALIPER            |
| 15   | 2    | 5020-0027    | SPACER, 5020 CALIPER                    |
| 16   | 2    | 5020-0011    | BALANCING LINK NO.1, 5020 CALIPER       |
| 17   | 2    | 5020-0012    | BALANCING LINK NO.2, 5020 CALIPER       |
| 18   | 4    | 1026-0516    | COTTER PIN; 1/8 DIA X 1 LG. 18-8        |
| 19   | 4    | 1002-0808    | SCREW, SKT HD CAP, #10 UNC x 1/2 LG, SS |
| 20   | 4    | 1023-0108    | WASHER FLAT #10 TYPE A SS               |



| ITEM | QTY. | PART NUMBER | DESCRIPTION                         |
|------|------|-------------|-------------------------------------|
| 1    | 1    | 5020-0005   | SHOE                                |
| 2    | 1    | 5020-0007   | BRAKE LINING, 3/8" K5, 5020 CALIPER |
| 3    | 11   | 1033-0807   | RIVET, BRAKE, 3/16 x 7/16           |



**Kobelt Manufacturing Co. Ltd.**

8238 129th Street  
Surrey, British Columbia,  
Canada, V3W 0A6

Sales Tel: +1-604-572-3935

Fax: +1-604-590-8313

Email: [sales@kobelt.com](mailto:sales@kobelt.com)

Website: [www.kobelt.com](http://www.kobelt.com)

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