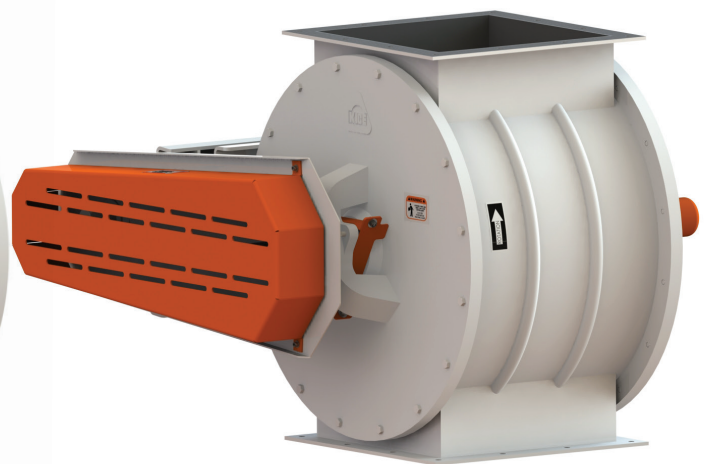




H Series



OT Series

## Rotary Airlock Operators Manual

Special execution, intended for use in potentially explosive atmosphere (zone 22) in conformity with category 3 of group II, according to the European ATEX Directive 2014/34/EU. The equipment has the following marking:

\*ATEX Directive applies to VJOT airlock only



II 3 D c 85°  
RAV-M01-0001

# 1. INTRODUCTION

When you purchased your new Kice Rotary Airlock, you bought a dependable and quality-built product. The range of options and materials of airlocks manufactured by Kice should satisfy nearly every conceivable industrial airlock need.

We are proud of our products and the people at Kice who build them. At Kice, we start in our own foundry and follow the design and manufacturing standards that have proven superior for more than 60 years.

This owner's manual is intended as a guide for proper installation, operation and maintenance to keep your Kice airlock operating safely and efficiently on the job. Service and factory reconditioning information is also included for your benefit.

Sincerely,

Drew Kice  
President  
Kice Industries, Inc.

## Warranty

The Company (Kice Industries, Inc.) warrants the equipment manufactured by the Company to be free of defects in material and workmanship for a period of one year from the date of shipment. Company agrees to repair or replace, at its option, any parts found to be defective in the opinion of the Company. Company is not liable for any costs in connection with the removal, shipment or reinstallation of said parts. This warranty does not apply to abrasion, corrosion, or erosion.

Purchaser agrees to look to the warranty, if any, of the manufacturer or supplier of equipment manufactured by others and supplied to the Company for any alleged defects in such equipment and for any damages or injuries caused thereby or as a result thereof.

### **PURCHASER SHALL BE RESPONSIBLE FOR COMPLIANCE WITH ELECTRICAL COMPONENT MANUFACTURER'S RECOMMENDATIONS, UNDERWRITERS CODE AND ALL SAFETY PRECAUTIONS.**

The only warranty extended under this agreement is the above express warranty and there are no other warranties, express or implied, including warranties of merchantability, fitness for a particular purpose or otherwise which extends beyond the face hereof. The Company and its dealers shall not in any event be liable for consequential or incidental damages and this agreement provides purchaser's sole and exclusive remedy. Any actions for breach of this agreement or warranty must be commenced within one year after the cause of action has occurred.

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## 2. IMPORTANT AIRLOCK INFORMATION

### Important Airlock Information

Write down the MODEL and SERIAL NUMBER of the Kice Rotary Airlock, along with the same information for the auxiliary equipment. (Airlock valves, fans, speed reducers, motors, and sheaves size, type and any special modifications to standard).

For additional information, application assistance or special service, please contact us by phone at 316-744-7151 or email at sales@kice.com. We'll need to know the MODEL and SERIAL NUMBER of your Kice Rotary Airlock. For ready reference, please record this information and the date of delivery or installation on the lines below. See the General Information section for the location of model and serial number.

Model \_\_\_\_\_

Serial Number \_\_\_\_\_

Date of Delivery or Installation \_\_\_\_/\_\_\_\_/\_\_\_\_

Additional Notes:

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### 3. GENERAL INFORMATION

#### To The Owner

The purpose of this manual is to assist owners and operators in maintaining and operating the Kice airlock. Please read it carefully; information and instructions furnished can help you achieve years of dependable performance. A separate gearmotor or speed reducer manual is included with your owner's packet. It contains additional information that may not be repeated in this manual. You are urged to read it before attempting any operation or repair of the gearmotor or speed reducer. If the manual is not included in your owner's packet, please contact our Customer Service Department.

#### Using This Manual

General operation and maintenance guidelines are outlined for owners and operators of Kice airlocks. Operating conditions vary considerably and cannot be addressed individually. Through experience however, operators should have no difficulty in developing good operating, safety and monitoring skills.

The terms **“disconnect and lockout”** or **“lockout/tagout”** as used in this manual means that power to the airlock has been disconnected through the use of a padlockable, manual power cutoff or power lockout switch pursuant to 29CFR1910.147.

Directions used in this manual, for example **RIGHT** or **LEFT, CLOCKWISE** or **COUNTERCLOCKWISE**, refer to directions when facing the endplate of the airlock to which the equipment tag containing the model and serial number is attached unless otherwise specified.

Photographs and illustrations were current at the time of printing but subsequent production changes may cause your airlock to vary slightly in detail. Kice Industries, Inc. reserves the right to redesign and change the airlock as deemed necessary, without notification. If a change has been made to your airlock that is not reflected in this owner's manual or the Illustrated Parts Lists, write or call Kice Industries, Inc. for current information and parts.

#### Model and Serial Number

The airlock model and serial number can be found on the equipment tag (Figure 1) on the endplate opposite the drive side, or stamped on the body (Figure 2) opposite the motor.

KICE INDUSTRIES, INC.  
5500 N. MILL HEIGHTS DR.  
WICHITA, KS 67219  
U.S.A.  
P: (316) 744-7151  
www.kice.com

MODEL:   
SERIAL:   
DATE:

Figure 1

KICE Industries, Inc.  
5500 N. Mill Heights Drive  
Wichita, KS 67219  
USA

CE

Inside: II 2D c 85°C  
Outside: II 3D c 85°C

CONFIGURATION  
ROTARY AIRLOCK

FIGURE-TYPE NO.  SERIAL NO.   
DRAWING / SPEC NO.  MONTH-YR MANUFACTURED

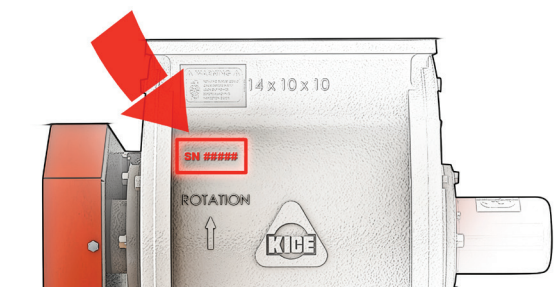


Figure 2

## **GENERAL INFORMATION CONTINUED**

### **Airlock Parts and Service**

Use original Kice rotary airlock replacement parts only. These parts are available from Kice Industries, Inc. only. To obtain prompt, efficient service always provide the following information when ordering parts:

1. Correct part description and number as shown in the appropriate exploded view.
2. Correct model number
3. Correct serial number

For service or assistance ordering parts, contact the Customer Service Department or Quick Ship Department.

**Kice Industries, Inc.  
5500 Mill Heights Drive  
Wichita, Kansas 67219-2358  
Toll Free: (877) 289-5423  
Main Phone: (316) 744-7151  
Fax: (316) 744-7355**

**IMPORTANT:** Any unauthorized modification, alteration or use of non-approved attachments or drive units voids the warranty and releases Kice Industries, Inc. from any liability arising from subsequent use of this equipment. Each airlock is configured to be used in specific situations, handling particular types of material. Using an airlock for any purpose other than that for which it was designed could result in personal injury as well as product or property damage.

**NOTICE:** Kice Industries, Inc. is the only authorized rebuilder of Kice rotary airlocks.

### **Gearmotor/Speed Reducer Parts and Service**

The gearmotor or speed reducer is covered by the manufacturer's warranty. If there is a question or issue concerning the gearmotor or speed reducer please contact your local supplier or service representative.

## 4. SAFETY PRECAUTIONS

### Safety Symbols



This safety alert symbol is used to call your attention to an important safety message on equipment, safety decals and in manuals, to warn you of possible danger to your personal safety. When you see this symbol, be alert. Your personal safety or the safety of others may be affected. Follow the instructions in the safety message.

### Hazard Levels

The following definitions are used to identify hazard levels:



**DANGER (RED)** – Danger is used to indicate the presence of a hazard that **WILL** cause **SEVERE** personal injury, death or substantial property damage if the warning is ignored.



**WARNING (ORANGE)** – Warning is used to indicate the presence of a hazard that **CAN** cause **SEVERE** personal injury, death or substantial property damage if the warning is ignored.

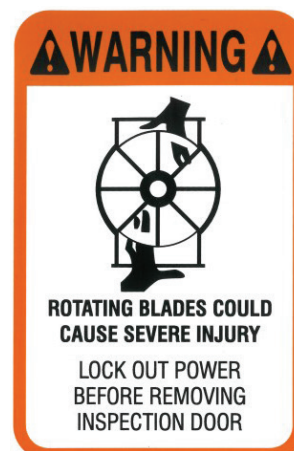


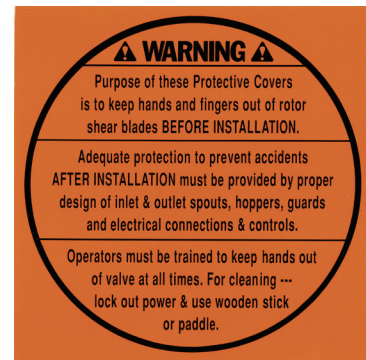
**CAUTION (YELLOW)** – Caution is used to indicate the presence of a hazard that **WILL** or **CAN** cause **MINOR** personal injury or property damage if the warning is ignored.

### Safety Decals

The airlock safety decals should not be removed, covered, painted or otherwise become illegible. If this occurs they should be replaced immediately. Contact Kice Industries, Inc. Customer Service Department for replacements.

The following safety decals will be located on the airlock body, chain guard or motor. Look for them!





**WARNING:** All owners and operators should read this manual and be instructed in safe operating and maintenance procedures before attempting to uncrate, install, operate, adjust or service this equipment.

## SAFETY PRECAUTIONS

### WORK SAFELY AT ALL TIMES

- All energy sources associated with the airlock must be locked and tagged out in compliance with 29CFR1910.147, local enforcement authorities, OSHA, and facility safety practices, before removing any protective cover, guard, grate or maintenance gate. Removal of transitions which expose hazards such as nip points of an airlock rotor also require lockout and tagout precautions be employed.
- Do not attempt to install, connect power, operate or service an airlock without proper instruction and until you have been thoroughly trained in its use by your employer.
- It is the owner's and employer's responsibility to adequately train each operator in the proper and safe use of airlocks. Written safety programs and formal instruction are essential. All new employees must be made aware of company policies, standard operating procedures (SOPs) and established health and safety procedures. Experienced employees should receive refresher training for potential hazards and up to date training records should be maintained at the job site.
- Assume at all times that power is "on". Treat all conditions as live. This practice ensures a cautious approach that may prevent an accident or injury.
- Before applying power to any equipment, make certain that all personnel are clear of the machine.
- Do not attempt to open, work on, clean or service an airlock until it has been locked and tagged out and the rotor has come to a complete stop. It is especially important to verify the airlock cannot be started in environments in which equipment is configured to be started remotely.
- Do not connect power to or operate an airlock unless all moving parts are covered and all covers, guards, grates, and maintenance panels are in place and securely fastened. If an airlock is not equipped with a factory supplied chain guard, make sure rotating members and moving parts are completely enclosed before connecting power and starting operation.
- All protective covers, guards, grates, maintenance panels, switches and warning decals must be kept in place and in good repair. Any airlock with a damaged, malfunctioning, defective, or missing protective device must be taken out of service until the protective device can be repaired or replaced.
- Do not attempt to start an airlock when loaded.
- Do not abuse, overload, or misuse an airlock or attempt to operate the equipment if in need of service, lubrication, maintenance or repair. Free outlet of the product must be guaranteed at all times. Blockage and severe damage may result, or a dangerous situation may occur.



## **SAFETY PRECAUTIONS CONTINUED**

- Never place any part of your body under or near rotating members or moving parts of an airlock.
- Never allow any kind of metal or other foreign objects to enter an airlock.
- The rotor of the airlock is built into a housing which has connection flanges for product inlet and product outlet. All airlock inlet and discharge openings must be completely enclosed, or closed to an adequate length, to prevent human access to the rotor when the airlock is operating. They must remain enclosed until POWER IS TURNED OFF AND LOCKED OUT. Keep away from an airlock when it is running.
- Do not manually override or electrically bypass any protective device.
- High voltage and rotating parts can cause series or fatal injury. Only qualified, trained, and experienced personnel should perform installation, operation, and maintenance of electrical machinery. Make sure the motor and frame of each airlock is grounded in accordance with OSHA, National Electric Code, and all other applicable regulatory bodies, including local codes and EN ISO 60204-1 as required for the classified area.
- Operator/installer must ensure that all piping and connections are laid away from equipment access routes and steps.
- If an airlock is equipped with a maintenance panel incorporating any Protective Interlocking Limit Switch (PLS), the PLS must be interlocked with all electrical controls so that all motors or powered devices on the unit will be de-energized if any protected cover, guard, grate, or maintenance panel is open or removed. Never attempt to manually override or electrically bypass the PLS safety device. Interlock function of the PLS must be tested and logged daily by supervisory personnel.
- Any device powered by air or hydraulic pressure must be equipped with a properly functioning Padlockable Manual Pressure Lockout and Internal Pressure Relief Valve (PLV) capable of safely relieving motive pressure between the isolation valve and device.
- Any airlocks used in the processing of combustible materials or in hazardous environments require evaluation by the owner and regulatory bodies to determine appropriate airlock monitoring equipment, dust control, explosion protection and electrical equipment enclosures. Do not use an airlock in hazardous environments unless properly equipped for the hazard.
- Operate safely at all times. Use personal protective equipment (PPE) such as hard hats, helmets, gloves, earplugs, protective eyewear, etcetera when and where appropriate. Keep PPE in good repair and accessible to affected personnel.
- Keep the workplace clean and free of dirt and dust at all times. Do not attempt to work on slippery or unsafe surfaces, ladders or work platforms when maintenance or repair work is being performed on an airlock.
- Do not use a ladder or work platform unless it is in good repair and rated for the load required to complete required airlock service. Do not exceed maximum load ratings when installing or servicing an airlock.
- Never stand under any kind of hoists or lifting mechanisms whether or not it is loaded or in operation. Never stand under or near an airlock or component when it is being lifted.
- All airlock lifting devices must be inspected by qualified personnel before each use. Do not use a lifting device to transport an airlock. Never use a lifting device that is damaged, deteriorated or in need of repair.
- Special attention must be devoted to outside contractors engaged to enter and perform work on an airlock or in the workplace. Special care must be exercised to ensure all such personnel are fully informed of potential hazards and plant safety procedures. Special emphasis should be placed on the use of explosion proof electrical, cutting, or welding tools where required.
- It is ultimately the operator's responsibility to apply the above listed precautions and ensure proper airlock use, maintenance and lubrication. Keep these instructions and list of warnings with your machine at all times.
- It cannot be assumed that every acceptable safety procedure is contained herein or that abnormal or unusual circumstances may not warrant or require additional procedures.

<b>WORK SAFELY AT ALL TIMES</b>
---------------------------------

### 3. DELIVERY INSPECTION AND INSTALLATION PREPARATION

The airlock has been inspected at Kice and should be in excellent condition upon delivery. A thorough customer inspection of the airlock should be completed upon receipt to verify its condition.

**NOTICE:** Delivery inspection should be completed before signing carrier's release

When a carrier signs the Kice Industries, Inc. bill of lading, the carrier accepts responsibility for any subsequent shortages or damage, evident or concealed. Therefore any resulting claim must be made against the carrier by the purchaser. Evident shortage or damage should be noted on the carrier's delivery document before signature of acceptance. Inspection by the carrier for damage, evident or concealed, must be requested.

1. Complete a visual inspection paying particular attention to guards, protrusions (i.e. gearmotor or speed reducer, airlock corners, shaft, etc.) and safety decals while the airlock is still secure to the shipping pallet.

2. Inspect the airlock shaft:

- Remove the shaft cover located on the non-drive end of the shaft and the chain guard (Figure 3).
- Check both ends of the shaft to see if either end has been bent or damaged. If this is the case, file a claim with the freight company for damages and contact Kice Customer Service Department.
- Replace the shaft cover and chain guard.
- Be sure that the cover is firmly in place.



**CAUTION:** The shaft cover must be in place at all times. If the cover is lost in shipment or during airlock operation, contact Kice Customer Service Department for replacement.

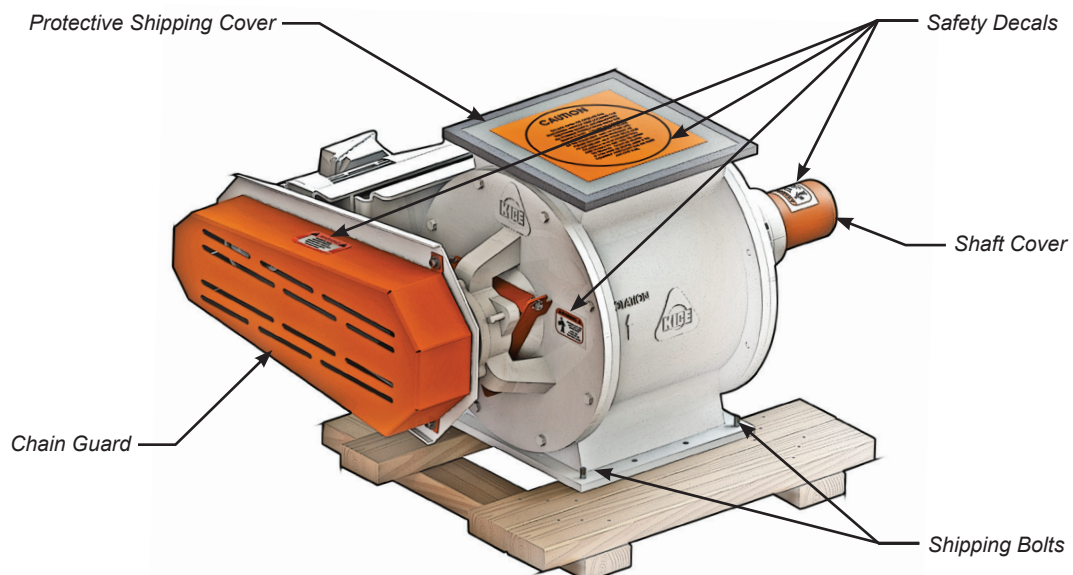


FIGURE 3

## DELIVERY INSPECTION AND INSTALLATION CONTINUED

### 3. Remove the airlock from the shipping pallet

- Remove shipping bolts securing airlock to the shipping pallet (Figure 3)
- Lift the airlock from the pallet using a tool truck, forklift or lifting gear with sufficient lifting capacity. The airlock should be lifted carefully by the body inlet and/or outlet flange.
- Set the airlock on a clean, smooth level surface.
- Check all bolts to be sure they are installed securely

### 4. Inspect the Rotor

- Locate and read all safety decals (Figure 3)
- Remove the protective shipping cover (Figure 3)



**DANGER:** When the protective shipping cover is removed from the airlock, do not place hands in the airlock or attempt to turn the rotor by hand. Personal injury could occur. Ensure all personal and foreign objects are clear of the inlet before attempting to turn rotor.

- Verify that the rotor rotates freely and check to make sure each rotor pocket and the interior of the airlock is free of foreign material.
- For airlocks without the drive motor attached, use a soft probe (wood block or brass rod) and mallet to turn the rotor (Figure 4). If the rotor turns freely, the inspection is complete.
- For airlocks with the drive motor attached, connect the airlock motor to the power source. If the rotor turns freely, disconnect the power source, the inspection is complete.
- If the rotor does not turn freely or the rotor turns but squeals loudly, refer to the Maintenance section of this manual.



**WARNING:** Always wear proper eye protection and other PPE as required.



**CAUTION:** If the gearmotor or speed reducer produces an unusual noise, disconnect the power and lockout. Then check rotation to be sure the motor is not wired backwards.

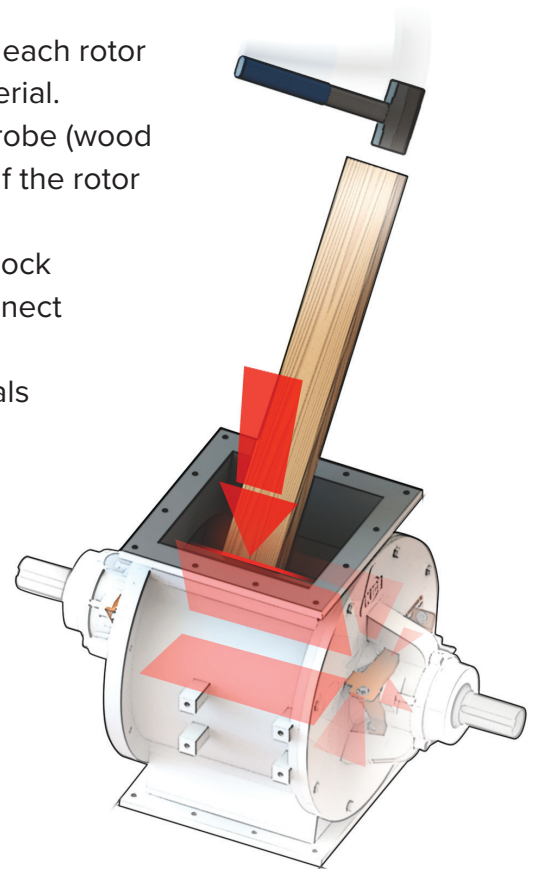


FIGURE 4

### 5. Inspect the gearmotor or speed reducer if supplied

- Read all the materials supplied with the airlock concerning the gearmotor or speed reducer.
- Be sure that the drive is securely mounted to the airlock.
- Kice standard gearmotors will be grease lubricated and require no further action.
- If the speed reducer is oil lubricated, add the appropriate oil as specified by the manufacturer.

## 6. STORAGE

If the airlock will not be installed promptly, certain procedures should be followed to ensure acceptable function upon installation. Below are guidelines which are applicable for standard airlocks. Included manuals for vendor supplied components supersede the guidelines listed below.

Store in a clean, dry location to prevent rust formation or deterioration.

If the airlock must be stored outdoors, the following precautions should be followed.

- Protect from environment as well as possible by covering to keep out dirt and moisture.
- Store on a skid with a fully covered deck to keep the airlock from resting directly on the ground while covering the outlet.

**NOTICE:** The outlet is not covered when shipped from the factory.

- Securely cover inlet using the steps below.
  - Remove shipping cover plate.
  - Transfer the position of the airlock flange's corner holes to the shipping cover plate and drill through holes.
  - Place a gasket on the airlock inlet.
- Bolt shipping cover plate in place.
- Cover motor and drives to prevent ingress of water, dirt and pests.

**NOTICE:** Turn the rotor a minimum of five revolutions monthly to maintain grease distribution within the bearings.

## 7. INSTALLATION



**WARNING:** Use appropriate equipment when lifting or moving the airlock. Make sure all persons and obstructions are clear from the path and installation area. When installing the equipment, make sure the moving parts inside the equipment are not accessible. This also fulfills EN ISO 13857-1 where required.

1. Move the airlock to the installation area using proper equipment. The airlock should be lifted carefully by the body inlet and/or outlet flange.
2. Prepare the mounting surfaces to accept the airlock. Equipment should be securely positioned before accepting an airlock. All mating surfaces should be free of debris, rust and foreign materials.

## INSTALLATION CONTINUED

### 3. Mount airlock in place.

- a. If the airlock will be floor mounted, secure to the floor using approved anchors and then attach the airlock mounting flange to the system flange using fasteners and supplied gasket(s) (Figure 5).

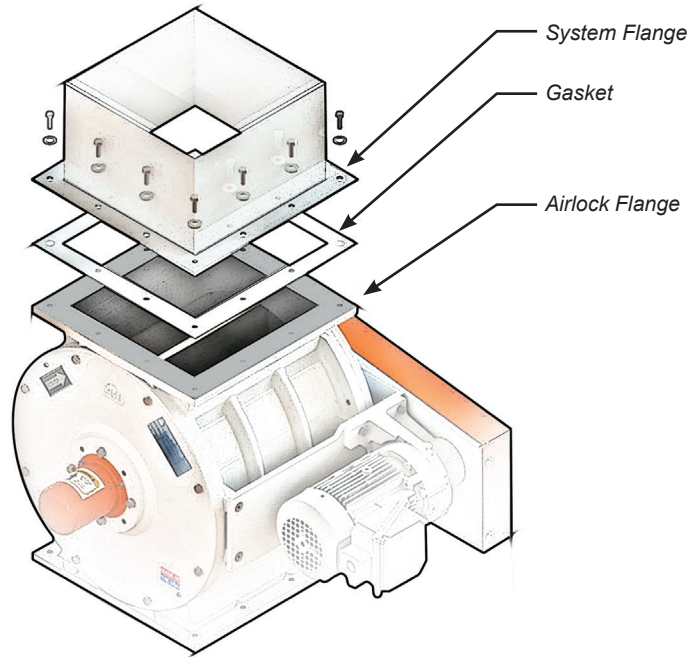


FIGURE 5

- b. If the airlock connects between two pieces of equipment, and is not floor mounted, attach the airlock flanges to system flanges using fasteners and supplied gaskets as shown (Figure 5). The airlock should be attached to the sturdiest equipment first.

### 4. Tighten all mounting fasteners securely.

5. Connect plant air if equipped. Some outboard airlocks use a pressurized air purge system or a pressurized shaft seal. Either type will be plumbed at Kice to provide a single compressed air connection and must be hooked up in order for the airlock to function properly.



**WARNING:** High voltage and rotating equipment can cause serious or fatal injury. Only qualified, trained and experienced personnel should perform installation, operation and maintenance of electrical machinery. Ensure the motor and frame of each airlock is grounded in accordance with OSHA, National Electric Code and all other applicable regulatory bodies and local codes.

### 6. Connect motor to power source.

7. Test run the airlock. If any unusual noises occur, disconnect and lockout the power source. If the airlock was turning the wrong direction, correct wiring and retest. Refer to Maintenance section below if the problem persists.

## INSTALLATION CONTINUED

8. On airlocks with **outboard bearings which utilize packing, the packing retainers will need to be tightened after approximately 2 hours of operation.** This can be done as described below.

- a. Use an open-end wrench to alternately tighten the packing retainer bolts (3) approximately 1/8 turn at a time as shown below (Figure 6).
- b. Equally tighten the bolts until the motor is strained or sounds like it begins to labor.
- c. Then back off each retainer bolt about 1/8 turn.

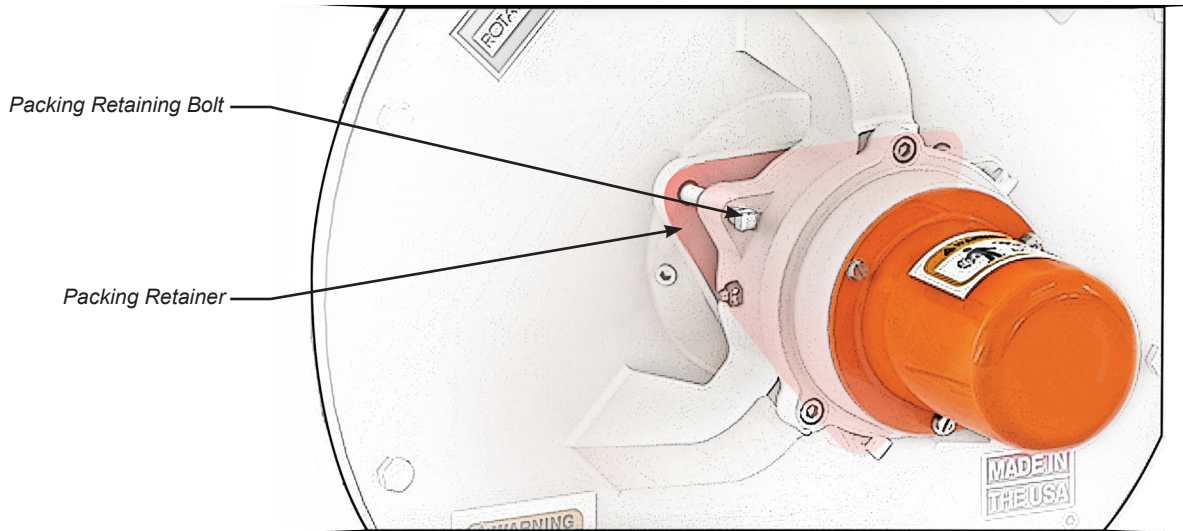


FIGURE 6

9. The chain tension should be checked after 48 hours of operation. Refer to the appropriate Maintenance section for recommended chain tensioning procedures. Repeat this step again after two to three weeks of operation.



**CAUTION:** Kice Industries, Inc. supplies self-lubricated chain on airlocks. Do not oil or otherwise lubricate.



## 8. MAINTENANCE

The key to long and trouble-free airlock operation is good maintenance practices. Periodically inspect the rotor for damage caused by foreign material and for proper rotor placement within the airlock body. Inspect the bearings and the drive chain for excessive wear. Finally, service the gearmotor or speed reducer as specified by the manufacturer.

The majority of airlock operating problems can be traced to improper adjustments and delayed or neglected maintenance. A consistently applied maintenance program will prevent many problems.

A thorough understanding of the system is required if the operating problems are to be corrected satisfactorily. A good rule to follow when troubleshooting a problem is to never make more than one adjustment at a time, thereby isolating the problem by a process of elimination. The cause of a problem is usually simple and is easy to pinpoint if you systematically check each system and function.

### General Motor Service

**NOTICE:** Not all airlocks use the same motor model. Service instructions and repair components may vary between models.

Safety, service and repair information for the gearmotor or speed reducer is provided by the manufacturer. To obtain parts or service for the gearmotor or speed reducer, contact the local dealer or service representative. If difficulty obtaining service or repair components is encountered, please contact the Kice Customer Service Department for assistance.

### General Rotor Maintenance

If the rotor becomes blocked, does not turn freely, or begins to squeal, the rotor should be inspected. The following steps describe the process required to complete an inspection.



**WARNING:** When performing maintenance, all energy sources associated with the airlock must be locked and tagged out in compliance with 29CFR1910.147, local enforcement authorities, OSHA, and facility safety practices, before removing any protective cover, guard, grate or maintenance gate. Removal of transitions which expose hazards such as nip points of an airlock rotor also require lockout and tagout precautions be employed.



**WARNING:** Review all Safety Precautions noted in the manual before performing maintenance on equipment.



**DANGER:** Never place hands or fingers in an airlock, unless it has been disconnected and locked out and a wooden block has been placed in the airlock to prevent the rotor from turning.

## MAINTENANCE AND SERVICE CONTINUED

1. Turn off the airlock and remove all potential energy sources following SOPs and lockout/tagout procedures.
2. Remove the airlock from system to obtain unobstructed access to rotor.
3. Place a block in the airlock to prevent the rotor from turning unexpectedly (Figure 7).
4. Remove rotor blockage
  - a. Using a probe, dislodge the obstruction from the rotor and discard.
  - b. Remove safety block.
  - c. Turn the rotor using the probe to inspect for additional foreign material.
5. Check for rotor damage. If rotor does not turn freely:
  - a. Locate rotor damage such as burrs or dents on rotor blades.
  - b. Remove any burrs using a file or emery cloth.

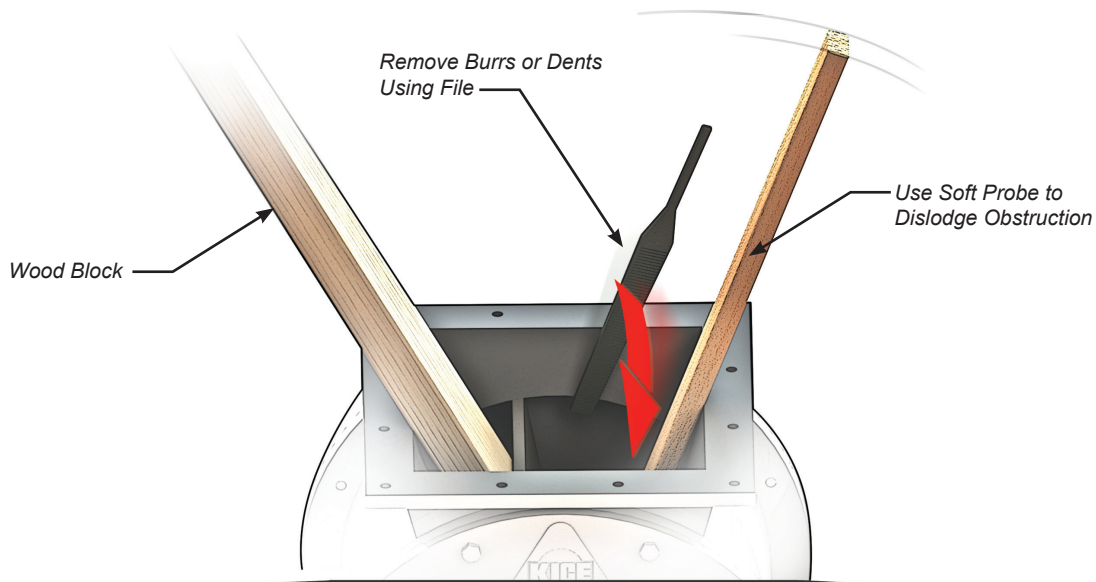


FIGURE 7



**CAUTION:** Remove the minimum amount of material required to eliminate burrs on close clearance faces of the rotor and body. Proper clearance must be maintained between rotor blades and the airlock body to retain appropriate function. Standard clearances vary based on airlock size and range between .004" and .006"  $\pm$  .001" though application specific adjustments may be applied.



# H SERIES

## Recommended Maintenance Schedule – H Series

Interval	Task
Daily	Perform a brief inspection. Look and listen for anything out of the ordinary while the airlock is running.
Biannually	Inspect sprockets and chain for wear
Annually	Inspect rotor for position, wear and damage.
5 years or every 10,000 hours	Replace cartridges, sprockets and chain.
Manufacturer recommended	Service gearmotor or speed reducer

**NOTICE:** Severe applications may require adjustments to the maintenance schedule above.



**WARNING:** When performing maintenance, all energy sources associated with the airlock must be locked and tagged out in compliance with 29CFR1910.147, local enforcement authorities, OSHA, and facility safety practices, before removing any protective cover, guard, grate or maintenance gate. Removal of transitions which expose hazards such as nip points of an airlock rotor also require lockout and tagout precautions be employed.



**WARNING:** Review all Safety Precautions noted in the manual before performing maintenance on equipment.



**DANGER:** Never place hands or fingers in an airlock, unless it has been disconnected and locked out and a wooden block has been placed in the airlock to prevent the rotor from turning.

## Chain Maintenance – H Series

Chain service life will be maximized when installed and maintained properly. Most chains require regular lubrication. However, the chain supplied by Kice is factory lubricated and further lubrication is not needed except in extreme applications. Follow the recommended chain maintenance guidelines below.

1. Turn off airlock and remove all potential energy sources following SOPs and lockout/tagout procedures before removing chain guard cover.
2. Confirm the sprockets are in good condition and teeth are not excessively worn.
3. Confirm the chain is free of grit and debris and is in good condition. Pins and bushings should not have flat surfaces and should release smoothly from each sprocket while in motion.
4. Verify all three sprockets are aligned in the same plane. The idler sprocket will determine the axial alignment plane.

## MAINTENANCE AND SERVICE CONTINUED

5. Adjust chain tension to allow chain deflection equal to 2% to 3% of shaft center distance.

*Example: Shaft center distance=7 inches → Chain deflection  $\approx$  .175 inches*

- Loosen nut on idler sprocket.
- Push idler sprocket up along the slide path to tighten chain (Figure 8).
- Secure idler sprocket position by tightening the idler sprocket nut.

**NOTICE:** The chain tension should be checked after 48 hours of operation. Check it again after two to three weeks of operation.

### Rotor Clearance – H Series

The rotor position may require adjustment as a result of heavy cyclical loads, obstruction between rotor and body, insufficiently secured bearing lock collars, wear, or when bearing cartridges are replaced. To adjust the rotor clearance:

- Turn off airlock and remove all potential energy sources following SOPs and lockout/tagout procedures.
- Remove airlock from system to obtain unobstructed access to rotor through the inlet of the airlock.
- Place a block in the airlock to prevent the rotor from turning unexpectedly (Figure 9).
- Using a feeler gauge, check the clearance between the rotor and the airlock end plates (Figure 9). **There should be a minimum of .003" to .004" standard clearance.**
- Prepare drive side.
  - Remove the chain guard cover.
  - Loosen idler sprocket to relieve chain tension and remove chain.
  - Remove drive sprocket and sprocket from airlock rotor.
  - Remove chain guard backplate.
- Remove shaft cover opposite the drive side.
- Loosen bearing lock collar set screw by turning counter clockwise.
- Disengage bearing lock collar from bearing by turning it using a punch and hammer. Loosen by rotating the collar in the direction opposite of normal shaft rotation (Figure 9.2).

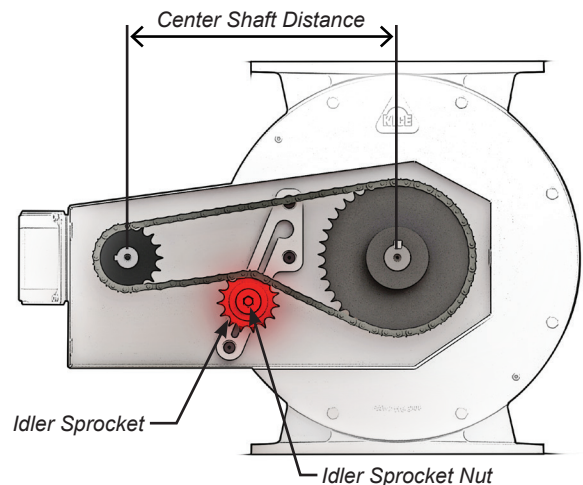


FIGURE 8

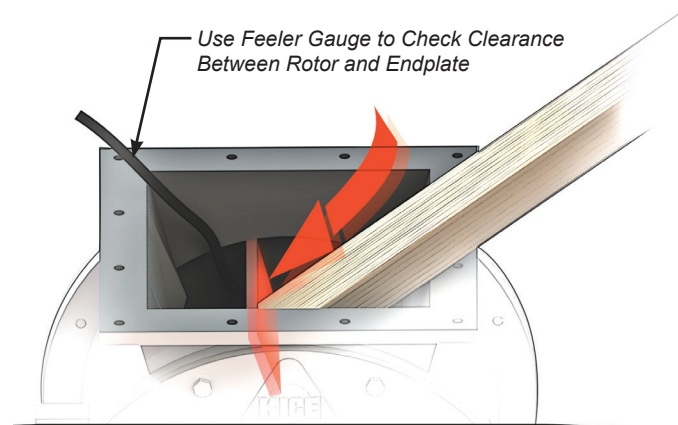


FIGURE 9

## MAINTENANCE AND SERVICE CONTINUED



**CAUTION:** Only insert punch in the unthreaded lock collar hole which is intended for this purpose to prevent irreparable lock collar damage.

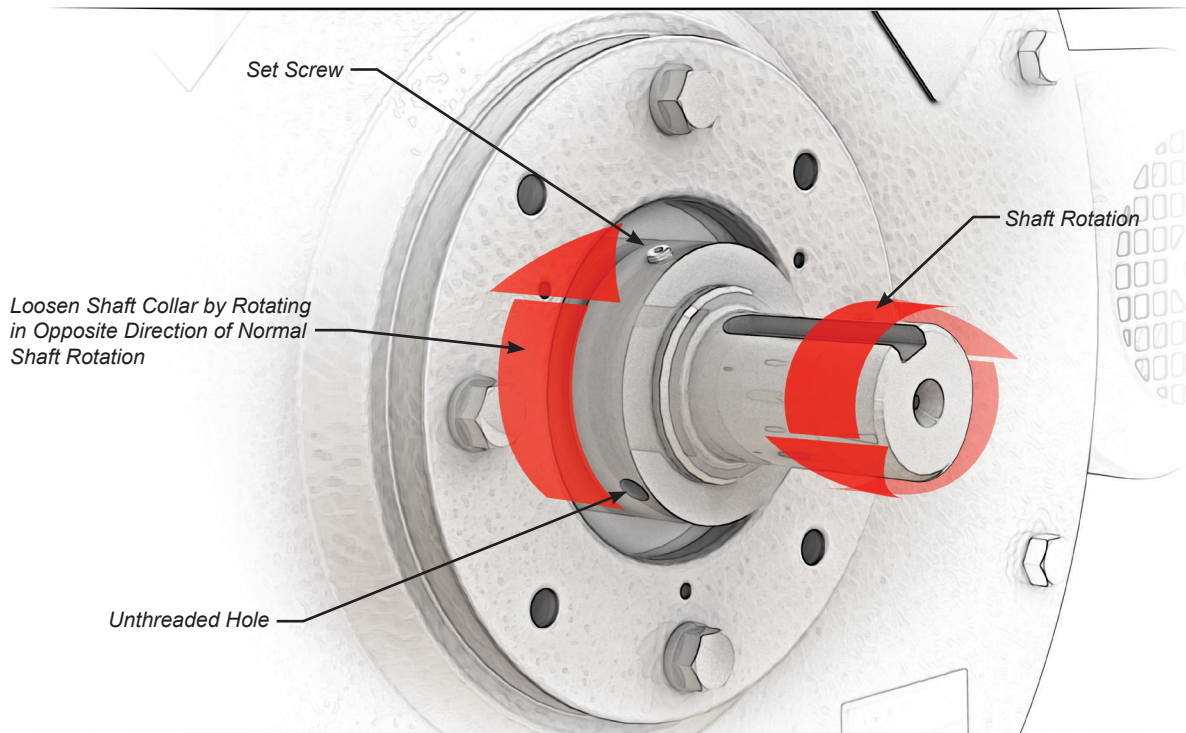


FIGURE 9.2

9. Repeat steps 7 and 8 for opposite side.
10. Using a rawhide hammer and feeler gauges, center the rotor in the body.
11. Tighten one bearing lock collar using a punch and hammer. Tighten the collar by rotating in the direction of normal shaft rotation.

**NOTICE:** Tightening bearing lock collars may cause the rotor to be drawn towards the end plate.

12. **Measure axial clearance. It should have a minimum of .003" to .004" clearance.** Extra clearance is acceptable.
13. Tighten remaining bearing lock collar using a punch and hammer. Tighten the collar by rotating in the direction of normal shaft rotation.
14. Verify clearance using feeler gauges.
15. Tighten bearing lock collar set screws by turning the set screw clockwise. Turn the rotor with the probe to see that it turns freely and quietly.
16. Reattach drive components and guards in the opposite order they were removed.

## Cartridge Replacement – H Series

The H Series airlocks utilize a cartridge containing the bearing and shaft seal. The cartridge is common to all H Series airlocks. To replace the cartridge:

1. Turn off airlock and remove all potential energy sources following SOPs and lockout/tagout procedures.
2. Remove airlock from system to obtain unobstructed access to endplates.
3. Place a block in the airlock to prevent the rotor from turning unexpectedly (Figure 9)
4. Prepare drive side.
  - a. Remove the chain guard cover.
  - b. Loosen idler sprocket and remove chain.
  - c. Remove drive sprocket and sprocket from airlock rotor.
  - d. Remove chain guard backplate.
5. Remove shaft cover opposite the drive side.
6. Loosen bearing lock collar set screw.
7. Disengage bearing lock collar from bearing by turning it using a punch and hammer. Loosen by rotating the collar in the direction opposite of normal shaft rotation (Figure 9.2).



**CAUTION:** Only insert punch in the unthreaded lock collar hole which is intended for this purpose to prevent irreparable lock collar damage.

8. Repeat steps 5 and 6 for opposite side.
9. Remove burrs on shaft left by bearing lock collar set screw using emery cloth. Also remove any paint or debris from the shaft bearing surface.



**CAUTION:** Burrs must be removed from both sides of the rotor shaft before attempting to remove the cartridge to reduce drag as bearing slides over the rotor shaft. Failure to remove paint from the rotor shaft may cause the rotor to become stuck in the bearing.

10. Remove cartridge bolts (Figure 10)
11. Thread two or four 3/8"-16 x 2 1/2" jack bolts into opposing threaded cartridge holes to contact endplate.

**NOTICE:** Use only hand tools while removing or installing cartridge to prevent binding in endplate.

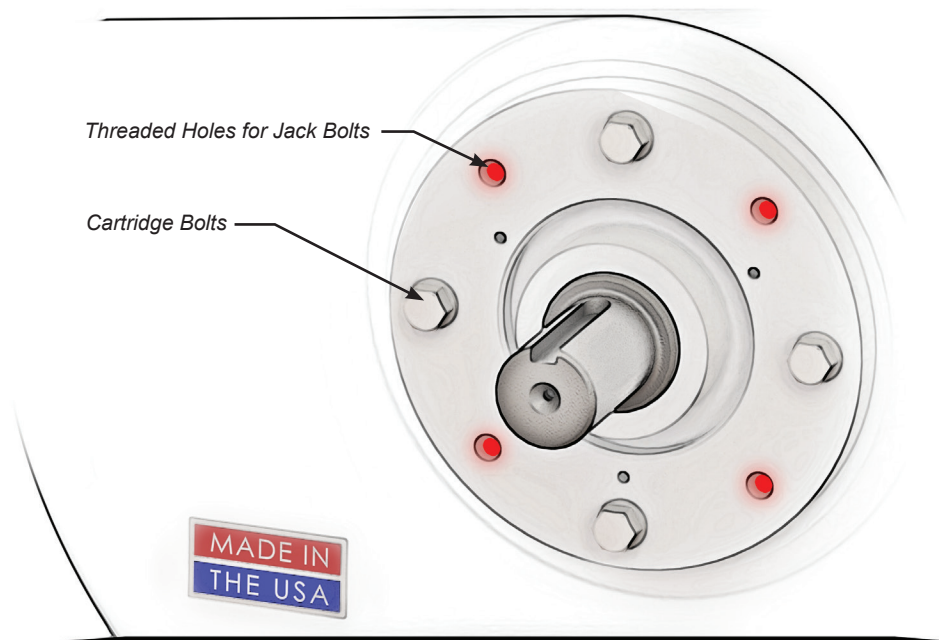


FIGURE 10

12. Alternately tighten opposing jack bolts (Figure 10)  $\frac{1}{4}$  turn at a time until cartridge can be pulled from endplate. Properly dispose of cartridge.
13. Remove any accumulated debris from endplate bore and rotor shaft using emery cloth.
14. Spread thin layer of supplied grease onto O-ring. Then place O-ring into the O-ring groove on the new cartridge.
15. Align **unthreaded cartridge holes** with **threaded endplate holes**.
16. Push cartridge into endplate with an upward arc motion.
17. Thread two or four  $\frac{3}{8}$ "-16 x  $1\frac{1}{2}$ " cap screws into opposing threaded endplate holes to contact cartridge. Cartridge bolts may be used as a depth gauge.
18. Alternately tighten  $\frac{3}{8}$ "-16 x  $1\frac{1}{2}$ " cap screws  $\frac{1}{4}$  turn at a time until cartridge bolts engage endplate threads.
19. Start two cartridge bolts then remove  $\frac{3}{8}$ "-16 x  $1\frac{1}{2}$ " cap screws.
20. Install remaining cartridge bolts and alternately tighten  $\frac{1}{4}$  turn at a time.
21. Repeat steps 8 through 19 for opposite side.
22. Using a rawhide hammer and feeler gauges, center the rotor in the body.
23. Tighten one bearing lock collar using a punch and hammer. Tighten the collar by rotating in the direction of normal shaft rotation.

**NOTICE:** Tightening bearing lock collars may cause the rotor to be drawn towards the bearing lock collar.

24. **Measure axial clearance. There should be a minimum of 0.003" to 0.004" clearance between rotor and endplate.**



## MAINTENANCE AND SERVICE CONTINUED

25. Tighten remaining bearing lock collar using a punch and hammer. Tighten the collar by rotating in the direction of normal shaft rotation.

26. **Verify clearance using feeler gauges.**

**NOTICE:** The rotor can shift during cartridge replacement. Rotor clearance must be verified after replacement. Less than minimum recommended clearance can cause premature wear or failure.

27. Tighten bearing lock collar set screws by turning the set screw clockwise. Turn the rotor with the probe to see that it turns freely and quietly.

28. Reattach drive components and guards in the opposite order they were removed.

## Removing Rotor – H Series

To remove the rotor:

1. Turn off airlock and remove all potential energy sources following SOPs and lockout/tagout procedures.
2. Remove airlock from system to obtain unobstructed access to rotor.
3. Prepare drive side.
  - a. Remove the chain guard cover.
  - b. Loosen idler sprocket and remove chain.
  - c. Remove drive sprocket and sprocket from airlock rotor.
  - d. Remove chain guard backplate.
4. Remove shaft cover opposite the drive side.
5. Match mark each endplate and body flange to ensure they are installed in the same position from which they were removed.
6. Position the rotor so two blades will contact the body on each side while being removed (Figure 11).
7. Place a block in the airlock to prevent the rotor from turning unexpectedly (Figure 9)
8. Remove both cartridges as noted in the Cartridge Replacement – H Series section above.
9. Remove the bolts on one endplate.
10. Alternately tighten endplate push out set screws to move endplate free of the body.
11. Remove endplate taking care not to hit rotor shaft to prevent damage. Complete a visual inspection for wear and damage.
12. The rotor may be pulled from the body. If additional assistance is required, use a rawhide hammer to firmly rap on the rotor shaft protruding through the opposite endplate.
13. Visually inspect the body bore for wear and damage.
14. Remove the endplate push out set screws so that they do not protrude out of the endplate mating flange face.
15. Reinstall the rotor and endplate with the same caution with which they were removed.

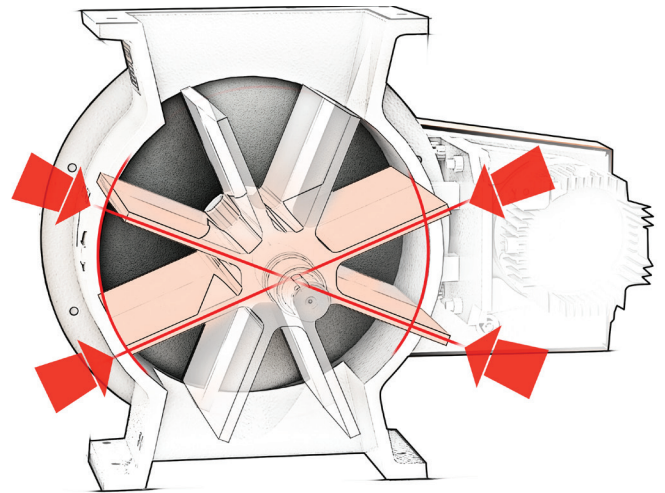


FIGURE 11

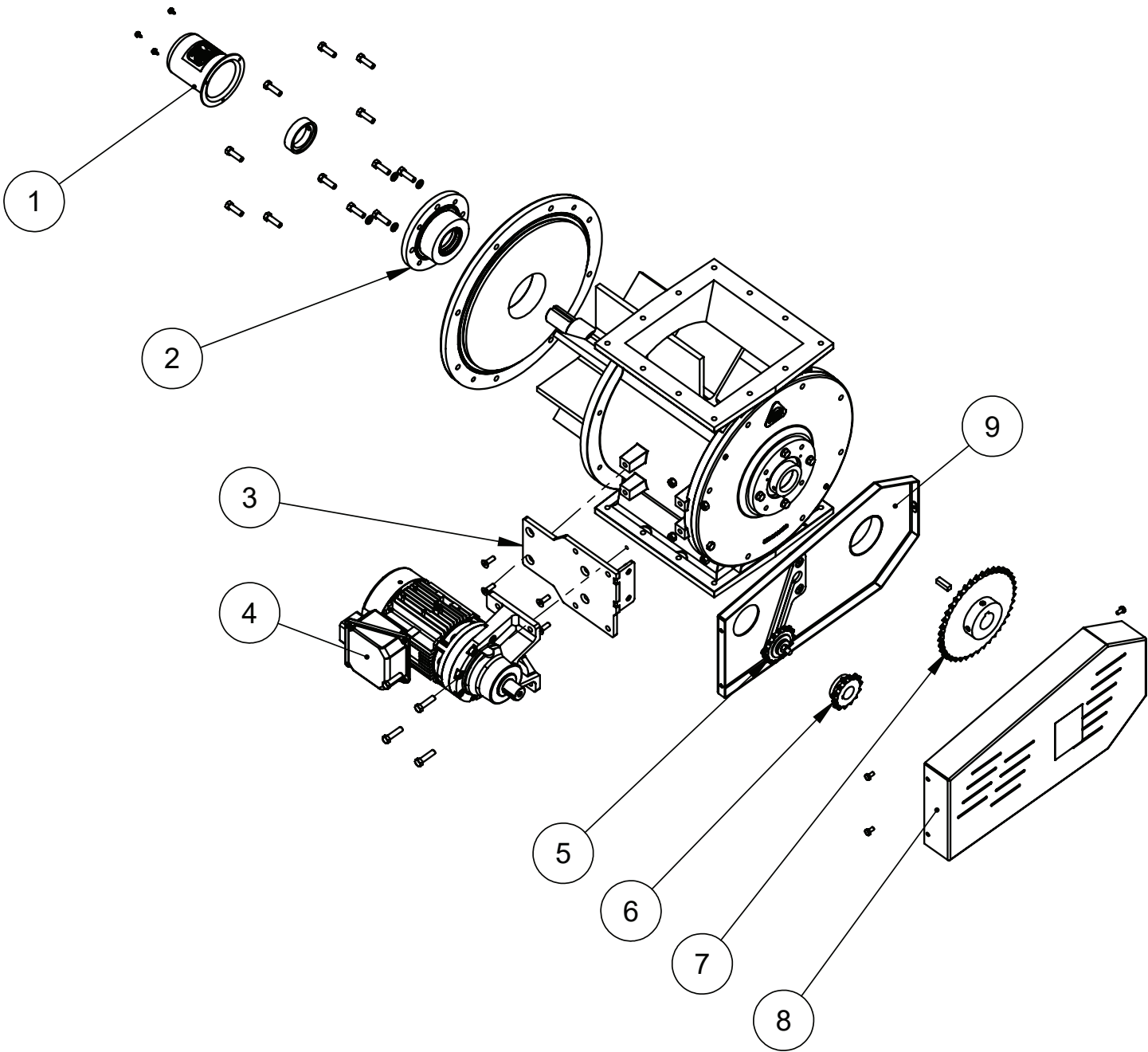
**MAINTENANCE AND SERVICE CONTINUED**

- 16. Install cartridges as noted in the Cartridge Replacement – H Series section above.
- 17. Follow instructions provided in the Rotor Clearance – H Series section above.
- 18. Reattach drive components and guards in the opposite order they were removed..

**Recommended Spare Parts – H Series**

Description	Kice Part Number	Applicable Airlocks
Cartridge Replacement Kit	RAV -2900-2001	Carbon steel H Series Airlocks

**Exploded View – H Series**




## MAINTENANCE AND SERVICE CONTINUED

Balloon #	Description	Kice Part #	Applicable Size
1	Shaft Guard w/ Rotating Parts Warning Decal	LI SHAFT GUARD EMC253X2	All H Series
2	Cartridge Replacement Kit	RAV-2900-2001	All carbon steel H Series
3	Motor Mount	RAV-2908-2000	14x10x10 H Series 30 and 20 rpm
3	Motor Mount	RAV-2916-2000	16x12x12 thru 24x15x15 H Series 30 and 20 rpm
3	Motor Mount	RAV-2920-2000	24x20x20 H Series 30 and 20 rpm
4	Gearmotor	10001410	14x10x10 thru 16x12x12 H Series 30 and 20 rpm
4	Gearmotor	10001203	18x12x12 thru 18x14x14 H Series 30 and 20 rpm
4	Gearmotor	10001408	thru 24x15x15 H Series 30 and 20 rpm
4	Gearmotor	10001205	24x20x20 H Series 30 and 20 rpm
5	Idler Sprocket	50BB15H	Ø14" thru Ø16" body H Series
5	Idler Sprocket	60BB12H	Ø18" body H Series
5	Idler Sprocket	80BB12H	Ø20" and Ø24" body H Series
6	Driver Sprocket	50BS14HT1 1/8	Ø14" thru Ø16" body H Series 30 and 20 rpm
6	Driver Sprocket	60BS16HT1 1/8	Ø18" body H Series – 30 rpm
6	Driver Sprocket	60BS11HT1 1/8	Ø18" body H Series – 20 rpm
6	Driver Sprocket	80BS19HT1 1/4	20x12x12 thru 24x15x15 H Series – 30 rpm
6	Driver Sprocket	80BS13HT1 1/4	20x12x12 thru 24x15x15 H Series – 20 rpm
6	Driver Sprocket	80BS19HT1 1/2	24x20x20 H Series – 30 rpm
6	Driver Sprocket	80BS13HT1 1/2	24x20x20 H Series – 20 rpm
7	Driven Sprocket	50BS28HT1 7/16	Ø16" body H Series – 30 rpm
7	Driven Sprocket	50BS40HT1 7/16	Ø14" body H series 30 and 20 rpm thru Ø16" body H Series 20 rpm
7	Driven Sprocket	60BS32HT1 15/16	Ø18 body H Series 30 and 20 rpm
7	Driven Sprocket	80BS38HT1 15/16	Ø20" thru Ø24" body H Series 30 and 20 rpm
8	Chain Guard Cover	RAV-2914-3080	Ø14" body H Series
8	Chain Guard Cover	RAV-2916-3080	Ø16" body H Series
8	Chain Guard Cover	RAV-2918-3080	Ø18" body H Series
8	Chain Guard Cover	RAV-2920-3080	Ø20" body H Series
8	Chain Guard Cover	RAV-2924-3080	Ø24" body H Series
9	Chain Guard Back Plate	RAV-2914-2020	Ø14" body H Series
9	Chain Guard Back Plate	RAV-2916-2020	Ø16" body H Series
9	Chain Guard Back Plate	RAV-2918-2020	Ø18" body H Series
9	Chain Guard Back Plate	RAV-2920-2020	Ø20" body H Series
9	Chain Guard Back Plate	RAV-2924-2020	Ø24" body H Series



# OT SERIES

## Recommended Maintenance Schedule – OT Series

Interval	Task
Daily	Perform a brief inspection. Look and listen for anything out of the ordinary while the airlock is running.
Every month or 200 hours	Inspect shaft seals and adjust packing retainer.
Every 3 months or 500 hours	Grease bearings using NLGI 2 Mystik JT-6 Hi-Temp grease.  <b>CAUTION</b> : Confirm each grease pressure relief valve operates freely before adding grease to bearings.
Biannually	Inspect sprockets and chain for wear. Replace packing.
Annually	Inspect rotor for position, wear and damage.
5 years or every 10,000 hours	Replace bearings, shaft seals, sprockets and chain.
Manufacturer recommended	Service gearmotor or speed reducer.

**NOTICE:** Severe applications may require adjustments to the maintenance schedule above.



**WARNING:** When performing maintenance, all energy sources associated with the airlock must be locked and tagged out in compliance with 29CFR1910.147, local enforcement authorities, OSHA, and facility safety practices, before removing any protective cover, guard, grate or maintenance gate. Removal of transitions which expose hazards such as nip points of an airlock rotor also require lockout and tagout precautions be employed.



**WARNING:** Review all Safety Precautions noted in the manual before performing maintenance on equipment.



**DANGER:** Never place hands or fingers in an airlock, unless it has been disconnected and locked out and a wooden block has been placed in the airlock to prevent the rotor from turning.

## Chain Maintenance – OT Series

Chain service life will be maximized when installed and maintained properly. Most chains require regular lubrication. However, the chain supplied by Kice Industries, Inc. is factory lubricated and further lubrication is not needed except in extreme applications. The following chain maintenance guidelines may be applied to achieve long service life.

## MAINTENANCE AND SERVICE CONTINUED

1. Turn off airlock and remove all potential energy sources following SOPs and lockout/tagout procedures before removing chain guard cover.
2. Confirm the sprockets are in good condition and teeth are not excessively worn.
3. Confirm chain is free of grit and debris and is in good condition. Pins and bushings should not have flat surfaces and should release smoothly from both sprockets while in motion.
4. Verify the sprockets are aligned in the same plane.
5. Adjust chain tension to allow chain deflection equal to 2% to 3% of shaft center distance.

*Example: Shaft center distance=7 inches → Chain deflection  $\approx$  .175 inches*

- a. Loosen jam nut on jack bolt as shown in motor mount jack bolt location (Figure 12).
- b. Turn jack bolt until desired tension is obtained.
- c. Secure jack bolt position by tightening the jam nut.

**NOTICE:** The chain tension should be checked after 48 hours of operation. Check it again after two to three weeks of operation.

## Drive Chain Sprockets

The drive chain sprocket on some airlocks is attached using a QD Bushing (see Figure 11.2). If the sprocket becomes worn, reference the following instructions to replace it:

1. Disconnect and lock out power.
2. Remove the chain guard.
3. Remove the drive chain by loosening the motor mount jack bolt.
4. Remove the sprocket. The sprocket is mounted to the airlock shaft using a QD bushing.

To remove the QD bushing:

- a. Loosen the setscrew on the QD bushing (see Figure 11.2).
- b. Loosen and remove all the mounting cap screws.
- c. Insert the cap screws into all the threaded jackscrew holes (Figure 11.2).
- d. Start with the screw farthest from the bushing saw slot and tighten all the jackscrews in small, equal amounts until the tapered surfaces of the bushing and sprocket disengage.
- e. When the sprocket has been loosened from the bushing, the bushing may be frozen to the shaft. To loosen the bushing from the shaft, insert a screwdriver into the bushing saw slot and tap lightly. The bushing will free itself from the shaft.

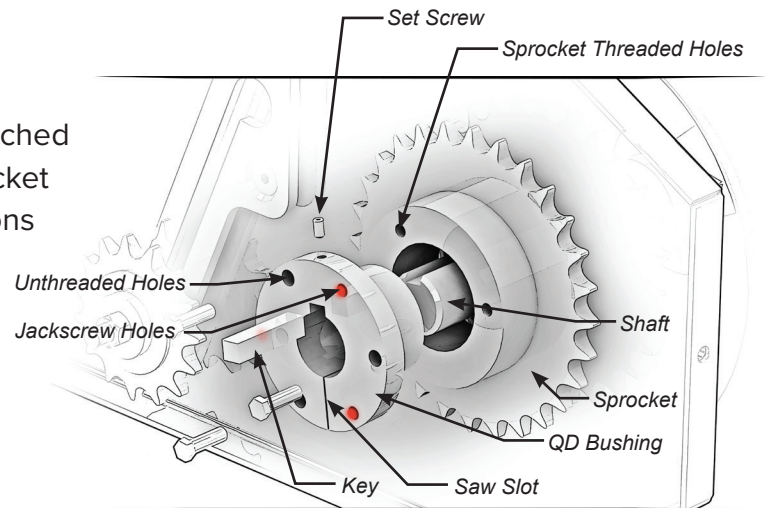


FIGURE 11.2



**CAUTION:** Excessive or unequal pressure on the jackscrews can break the bushing flange, making removal nearly impossible.

## MAINTENANCE AND SERVICE CONTINUED

5. Remove the sprocket by slipping it off the shaft.
6. Install a new sprocket onto the airlock shaft.
7. Reinstall the QD bushing.
  - a. Remove all the cap screws from the jackscrew holes.
  - b. Line up the unthreaded holes in the QD bushing (Figure 11.2) with the threaded holes in the sprocket (Figure 11.2) and insert the cap screws with the lock washers. Engage only two or three threads.
  - c. With the key in the shaft keyway, slide the loosely assembled bushing and sprocket onto the shaft and position for good chain alignment. Use no lubricants or anti-seize compounds on the threads or the tapered surfaces.
  - d. Carefully tighten the cap screws alternately and progressively until the tapers are seated (at approximately half the recommended torque).
  - e. Continue careful alternate and progressive tightening of the cap screws. Torque to 6 ft-lbs.

**NOTE:** When properly mounted, there will be a gap between the bushing flange and the sprocket after the cap screws are fully tightened.



**CAUTION:** Use of lubricants and/or excessive screw torque can cause breakage.

- f. Tighten the setscrew to hold the key securely during operation.

**NOTE:** After the cap screws are installed (step 7C), but before they are tightened, align the sprockets by sighting from the driven sprocket (mounted to the airlock shaft) along the chain to the driver sprocket (mounted to the speed reducer shaft). The driven sprocket and bushing should be free on the shaft at this point. As the cap screws are tightened, the sprocket may pull out of alignment. A little practice will show how to allow for this, so that when the cap screws are tight, the sprockets will be aligned. When the QD bushing is tight on the shaft, tighten the set screw in the bushing flange.

- g. Align the driver sprocket on the speed reducer shaft with the driven sprocket on the airlock shaft.
8. Reinstall the drive chain.
9. Reinstall the chain guard.
10. Reconnect power.

## MAINTENANCE AND SERVICE CONTINUED

### Rotor Clearance – OT Series

The rotor position may require adjustment as a result of heavy cyclical loads, obstruction bound between rotor and body, insufficiently secured bearing lock nuts, or wear. To adjust the rotor clearance:

1. Turn off airlock and remove all potential energy sources following SOPs and lockout/tagout procedures.
2. Remove airlock from system to obtain unobstructed access to rotor.
3. Place a block in the airlock to prevent the rotor from turning unexpectedly (Figure 9).
4. Using a feeler gauge, check the clearance between the rotor and the airlock end plates (Figure 9).

**There should be a minimum of .003” to .004” standard clearance.**

5. Prepare drive side.
  - a. Remove the chain guard cover.
  - b. Loosen motor mount jack bolt to relieve chain tension and remove chain.
  - c. Remove drive sprocket and sprocket from airlock rotor.
  - d. Remove chain guard backplate.
6. Remove shaft cover opposite the drive side.
7. Remove packing following the Packing Replacement instructions in the Shaft Seal Maintenance – OT Series section.
8. Confirm each grease pressure relief valve operates freely.

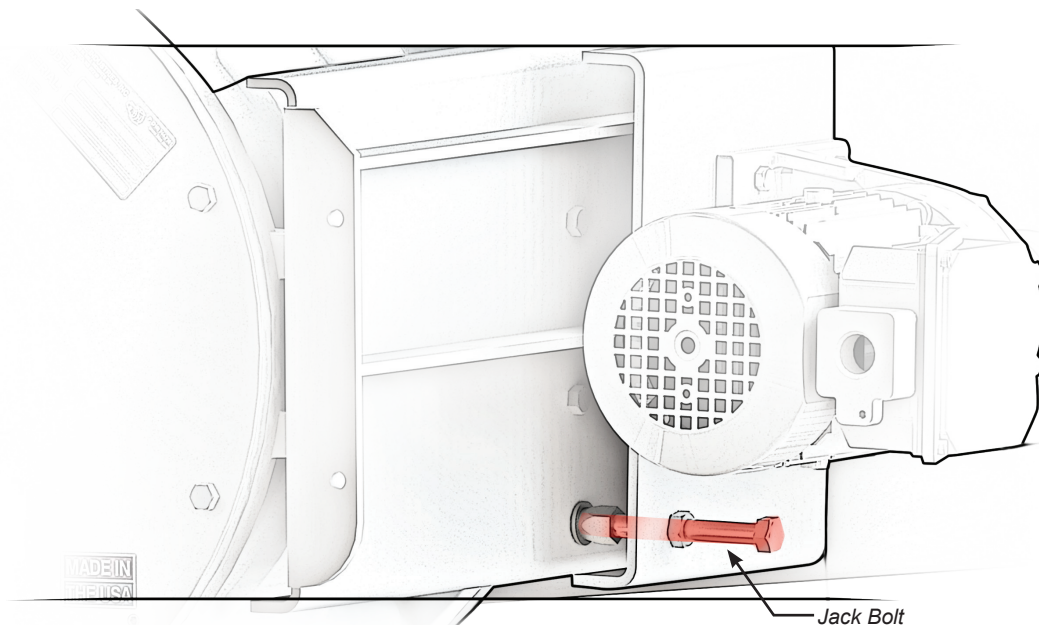
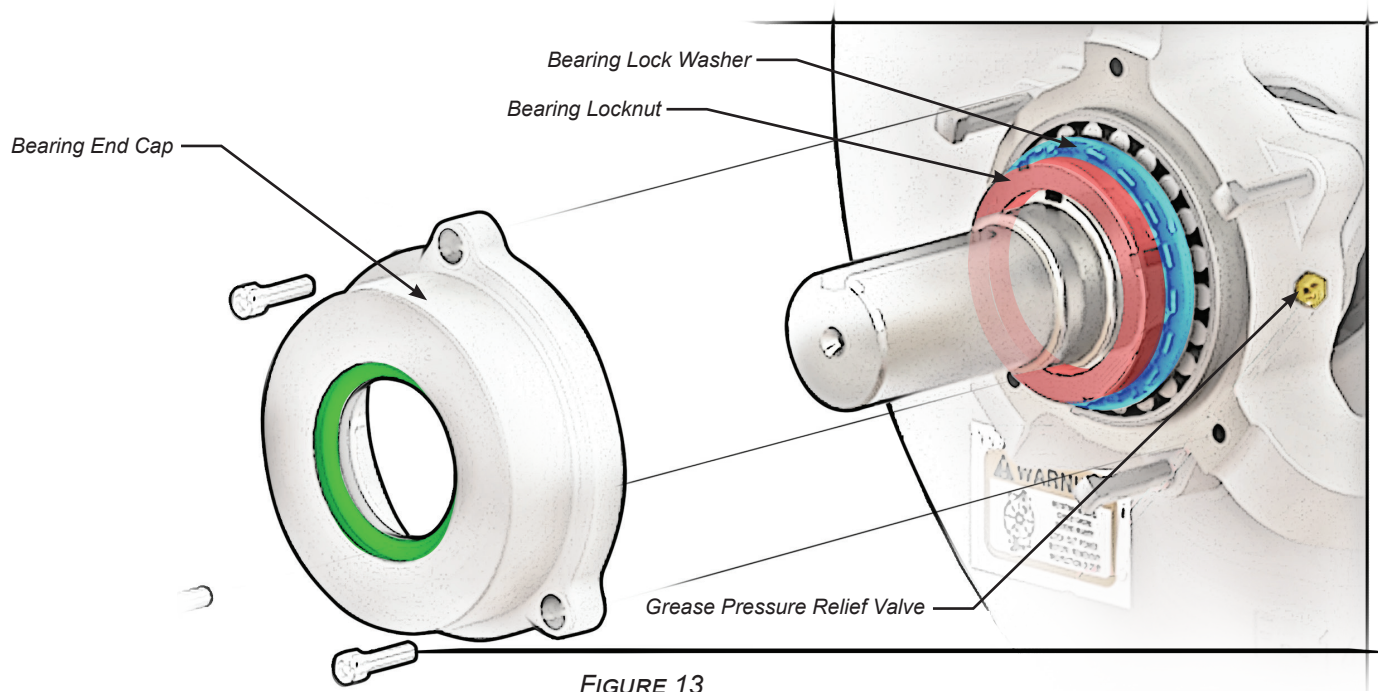


FIGURE 12



9. Remove both bearing endcaps from bearing supports as shown (Figure 13).
10. Clean grease from bearing using a clean shop towel.
11. Straighten the bearing lock washer tab engaged with bearing lock nut on each side as shown (Figure 13).
12. Using a spanner wrench, loosen one bearing lock nut while tightening the other. To increase the clearance between the rotor and near side end plate, loosen (CCW) the bearing lock nut on the near side while tightening the lock nut on the opposite side. To decrease the clearance between the rotor and near side endplate, tighten (CW) the lock nut on the near side while loosening the lock nut on the opposite side.
13. When desired clearance is achieved, bend down a bearing lock washer tab into a bearing lock nut slot on each side to secure the lock nuts in place.
14. Reinstall the end caps onto the bearing supports and grease the bearings using appropriate grease.

**NOTICE:** Confirm each grease pressure relief valve operates freely before adding grease to bearings.

15. Install new packing following Packing Replacement instructions in the Shaft Seal Maintenance – OT Series section.
16. Turn the rotor with the probe to see that it turns freely and quietly.
17. Reattach drive components and guards in the opposite order they were removed.

## PACKING MAINTENANCE

### Shaft Seal Maintenance – OT Series

The seals require regular maintenance to ensure effective performance. Outboard airlocks typically utilize two basic types of seals; packing or lantern rings (air seal). Maintenance and replacement of each is described below.

**NOTICE:** Inspect and **adjust the packing retainers after two hours of operation** then about every month or 200 hours thereafter as needed using the following steps.

1. With an open-end wrench alternately tighten the (3) packing retainer bolts 1/8 turn at a time (Figure 6).
2. Equally tighten the bolts until the motor begins to labor.
3. Back off each packing retainer bolt 1/8 turn.



**CAUTION:** Proper compression of the packing will prevent shaft damage. Loose packing may allow debris to accumulate between the packing and rotor shaft thereby scoring the rotor shaft. Conversely, excessively tight packing may cause the packing itself to wear grooves into the rotor shaft.

### Packing Replacement

Braided packing should be replaced every six months or when it can longer be tightened to provide an effective seal. To change the packing:

1. Turn off airlock and remove all potential energy sources following SOPs and lockout/tagout procedures.
2. Prepare drive side.
  - a. Remove the chain guard cover.
  - b. Loosen motor mount jack bolt to relieve chain tension and remove chain (Figure 12).
  - c. Remove drive sprocket and sprocket from airlock rotor.
  - d. Remove chain guard backplate.
3. Loosen packing retainer bolts as shown (Figure 6).
4. Slide packing retainer out of packing gland.
5. Remove old packing.
  - a. Use a flexible packing extractor such as a Chesterton #002501.

**NOTICE:** Avoid allowing the extractor tool to contact the rotor shaft. The tool may score the shaft sealing surface.

- b. Engage the extractor tool into the packing then pull out the packing ring.
- c. Repeat steps (a) through (c) until all packing rings are removed from the endplate.



## PACKING REPLACEMENT CONTINUED

6. Clean packing gland and shaft ensuring all packing fragments and debris are removed.
7. Inspect shaft sealing surface for damage and wear. Small imperfections may be removed with emery cloth.
8. Repeat steps 3 through 7 for the opposite endplate.
9. Prepare new rings of packing for installation.
10. Wrap the first ring around the shaft and note the position of the joint (Figure 14).
11. Push the first ring into the packing gland using the packing retainer.
12. Slide packing retainer out of the packing gland.
13. Wrap the second ring around the shaft and offset the joint 180° from the position of the first ring (Figure 14). Push it into the packing gland using the packing retainer then slide packing retainer out of packing gland.
14. Wrap the third ring around the shaft and offset the joint 180° from the second ring (Figure 14). Push it into the packing gland using the packing retainer.
15. Evenly tighten the packing retainer bolts until light pressure is applied to packing.
16. Repeat steps 10 through 15 for the opposite endplate.
17. Reattach drive components and guards in the opposite order they were removed.
18. Restore power to airlock with no material passing through the airlock.
19. Equally tighten the bolts until the motor begins to labor.
20. Back off each retainer bolt 1/8 turn.
21. Repeat steps 19 and 20 **after two hours of run time**.

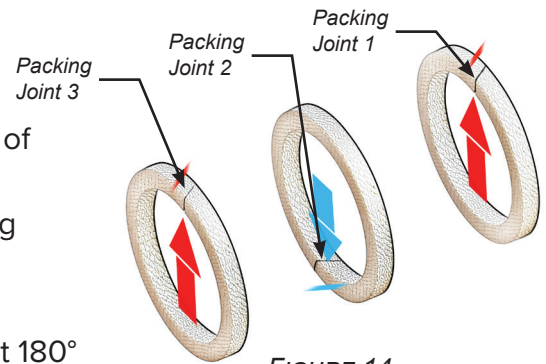


FIGURE 14

## Lantern Ring Seal Maintenance

Optional lantern ring seals are used when purge air is applied to sweep debris from the rotor shaft and are sealed on the back side with two rings of braided packing. Because the air is added to the product stream, it should be clean dry air and some installations may require sterile air.



**WARNING:** Failure to supply plant air to seals before allowing material to pass through the airlock will result in premature seal failure and shaft damage.

Inspect and **adjust packing retainers as needed after two hours of operation** then about every month or 200 hours thereafter using the following steps.

1. Verify the plant air pressure supplied by the regulator is at least 2 psig greater than conveying pressure.
2. With an open-end wrench alternately tighten the packing retainer bolts 1/8 turn at a time as shown (Figure 6).
3. Equally tighten the bolts until the motor begins to labor.
4. Back off each retainer bolt 1/8 turn.

## LANTERN RING SEAL REPLACEMENT



**CAUTION:** Proper compression of the packing will prevent shaft damage. Loose packing may allow plant air to leak to atmosphere rather than being directed towards the rotor and cause debris to accumulate in the lantern ring thereby scoring the rotor shaft. Conversely, excessively tight packing may cause the packing itself to wear grooves into the rotor shaft.

5. With no material passing through the airlock, confirm plant air is being delivered to the lantern ring.

## Lantern Ring Seal Replacement

Braided packing rings should be replaced every six months, or when they cannot be tightened to provide an effective seal, following the Packing Replacement instructions in the Shaft Seal Maintenance – OT Series section. To install new lantern rings the following steps may be referenced.

1. Turn off airlock and remove all potential energy sources following SOPs and lockout/tagout procedures.
2. Remove airlock from system to obtain unobstructed access to endplates.
3. Follow Packing Replacement instructions in the Shaft Seal Maintenance – OT Series section to remove packing.
4. Position the rotor so two blades will contact the body once endplates are removed (Figure 11).
5. Place a block in the airlock to prevent the rotor from turning unexpectedly (Figure 9).
6. Remove bearing end cap (Figure 13).
7. Straighten the bearing lock washer tab engaged with bearing locknut as shown (Figure 13).
8. Remove the bearing lock nut using a spanner wrench (Figure 13).
9. Slide the bearing lock washer and tongue washer off the rotor shaft.
10. Remove the bolts on one endplate.
11. Alternately tighten endplate push out set screws to move endplate free of the body.
12. Remove endplate from the rotor shaft taking care not to drop the bearing or packing retainer as they are pulled away from the rotor shaft.
13. Remove used lantern ring from the endplate and dispose of properly.
14. Clean packing gland and shaft ensuring all packing fragments and debris are removed.
15. Inspect shaft sealing surface and packing gland for damage and wear. Small imperfections may be removed with emery cloth.
16. Insert new lantern ring into packing gland with the chamfered edge facing the rotor (Figure 15). A stamped “R” may additionally be found on the rotor facing side of the lantern ring.

**NOTICE:** Lantern rings are not symmetric and must be oriented correctly so air is directed towards the rotor to function as intended.



## LANTERN RING SEAL REPLACEMENT CONTINUED

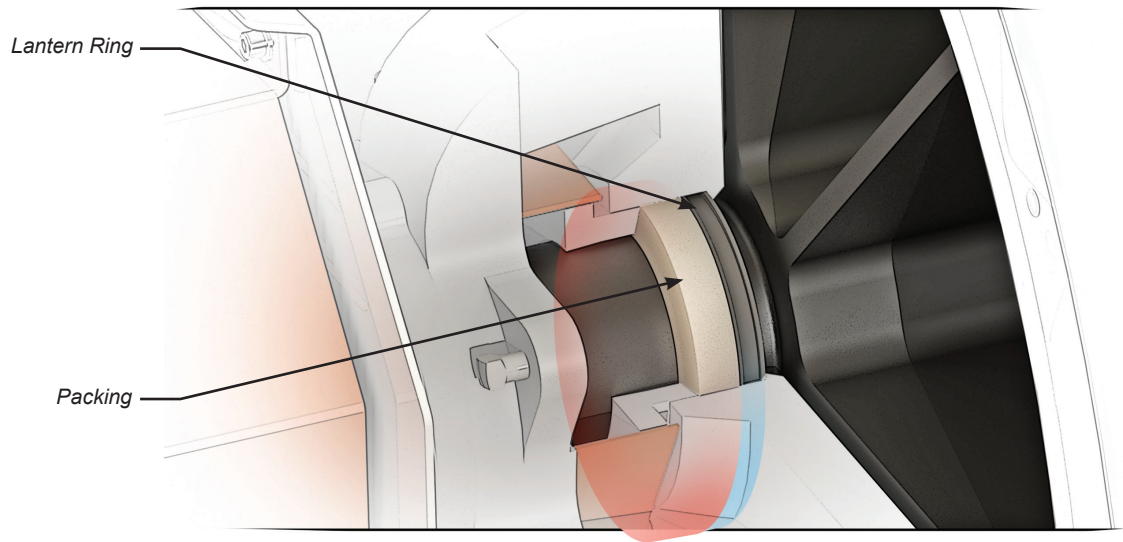


FIGURE 15

17. Remove the endplate push out set screws so that they do not protrude out of the endplate mating flange face.
18. Reinstall endplate with the same caution with which it was removed.
19. Follow instructions provided to set Rotor Clearance – OT Series.
20. Prepare **two** new rings of packing for installation.

**NOTICE:** Only 2 packing rings are needed with Lantern Ring seal.

21. Follow Packing Replacement – OT Series instructions.
22. Repeat steps 5 through 20 for the opposite endplate.
23. Supply plant air to lantern rings.

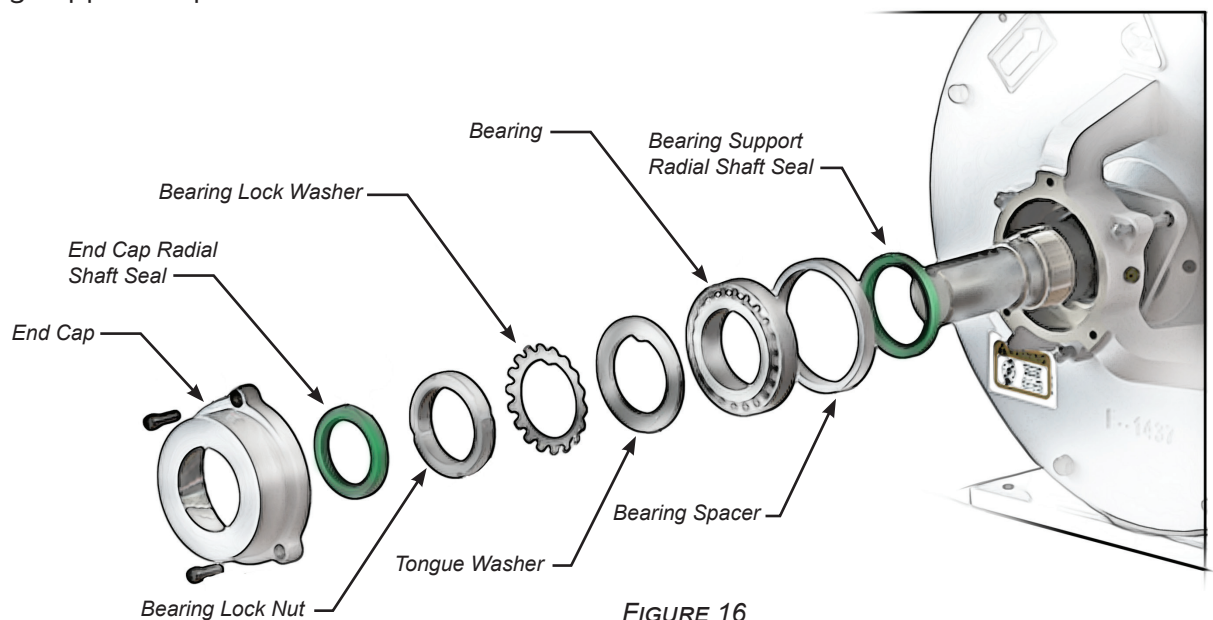
## Bearing Replacement – OT Series

All VJOT airlocks utilize tapered roller bearings in each endplate and are contained within an integrated outboard bearing support. They may be changed in the following manner.

1. Turn off airlock and remove all potential energy sources following SOPs and lockout/tagout procedures.
2. Remove airlock from system to obtain unobstructed access to endplates.
3. Position the rotor so two blades will contact the body once endplates are removed (Figure 9).
4. Place a block in the airlock to prevent the rotor from turning unexpectedly (Figure 9).
5. Remove bearing end cap (Figure 13).
6. Straighten the bearing lock washer tab engaged with bearing locknut as shown (Figure 13).
7. Remove the bearing lock nut using a spanner wrench (Figure 13).
8. Slide the bearing lock washer and tongue washer off the rotor shaft.

## BEARING REPLACEMENT CONTINUED

9. Remove the bolts on one endplate.
10. Alternately tighten endplate push out set screws to move endplate free of the body.
11. Remove endplate from the rotor shaft taking care not to drop the bearing or packing retainer as they are pulled away from the rotor shaft (Figure 16).
12. Pull bearing from endplate bearing support.
13. Slide bearing spacer out of bearing support.
14. Press used radial shaft seal out of bearing support and dispose of properly.
15. Clean packing gland and shaft ensuring all packing fragments and debris are removed.
16. Inspect shaft sealing surface and packing gland for damage and wear. Small imperfections may be removed with emery cloth.
17. Verify the grease zerk accepts grease and is clean by pushing a few pumps of grease through the zerk.
18. Confirm the grease pressure relief valve operates freely.
19. Thoroughly clean interior surfaces of the bearing support and packing gland.
20. Install a new radial shaft seal in bearing support.
21. Loosen the endplate push out set screws positioning them below the endplate mating flange face.
22. Position packing retainer between bearing support and packing gland.
23. Reinstall endplate with the same caution with which it was removed.
24. Thoroughly clean bearing spacer and slide it into bearing support.
25. Install new bearing until it is firmly in contact with bearing spacer and bearing spacer is pushed against bearing support step.



**NOTICE:** The bearing does not require the assistance of tools to install when properly aligned. Please refrain from striking the bearing to prevent bearing damage which will decrease service life.

## BEARING REPLACEMENT CONTINUED

26. Work grease into all bearing cone voids and push into bearing cone.
27. Slide tongue washer and bearing lock washer over shaft with respective tabs in shaft keyway until tongue washer contacts the bearing.
28. Hand tighten bearing locknut against bearing lock washer.
29. Repeat steps 4 through 27 for the opposite endplate.
30. Follow instructions provided to set Rotor Clearance – OT Series.
31. Install bearing end cap and grease bearing.

**NOTICE:** Confirm each grease pressure relief valve operates freely before adding grease to bearings.

32. If necessary, install new packing following the Packing Replacement instructions in the Shaft Seal Maintenance – OT Series section.
33. Reattach drive components and guards in the opposite order they were removed.

## Removing Rotor– OT Series

Removing the rotor is infrequently required. If however an occasion arises necessitating it be removed, the task may be completed in the following manner.

1. Turn off airlock and remove all potential energy sources following SOPs and lockout/tagout procedures.
2. Remove airlock from system to obtain unobstructed access to airlock.
3. Follow Packing Replacement instructions in the Shaft Seal Maintenance – OT Series section to remove packing and disconnect the drive.
4. Position the rotor so two blades will contact the body once endplates are removed (Figure 11).
5. Place a block in the airlock to prevent the rotor from turning unexpectedly (Figure 9).
6. Remove bearing end cap (Figure 13).
7. Straighten the bearing lock washer tab engaged with bearing locknut as shown (Figure 13).
8. Remove the bearing lock nut using a spanner wrench (Figure 13)
9. Slide the bearing lock washer and tongue washer off the rotor shaft.
10. Repeat steps 3 through 8 for the opposite endplate.
11. Remove the bolts on one endplate.
12. Alternately tighten endplate push out set screws to move endplate free of the body.
13. Remove endplate from the rotor shaft taking care not to drop the bearing or packing retainer as they are pulled away from the rotor shaft.
14. Complete a visual inspection for wear and damage to the endplate.
15. The rotor may be pulled from the body. Prepare to catch the opposite endplate's packing retainer as the rotor shaft slides through. If additional assistance is required, use a rawhide hammer to firmly rap on the rotor shaft protruding through the opposite endplate.
16. Visually inspect the body bore for wear and damage.

## REMOVING ROTOR - OT SERIES CONTINUED

17. Remove the endplate push out set screws so that they do not protrude out of the endplate mating flange face.
18. Reinstall rotor with blades positioned as shown (Figure 11).

**NOTICE:** Remember to position the packing retainer for the endplate which was not removed such that the rotor shaft passes through during installation.

19. Position packing retainer between bearing support and packing gland.
20. Reinstall endplate with the same caution with which it was removed.
21. Reinstall tongue washer, tabbed bearing lock washer and bearing lock nut (Figure 16).

**NOTICE:** Verify no dirt or debris has contaminated the bearing or grease to prolong bearing service life.

22. Follow instructions provided to set Rotor Clearance – OT Series.
23. Install bearing end cap and grease bearing.

**NOTICE:** Confirm each grease pressure relief valve operates freely before adding grease to bearings.

24. Install new packing following the Packing Replacement instructions in the Shaft Seal Maintenance – OT Series section.
25. Reattach drive components and guards in the opposite order they were removed.

## RECOMMENDED SPARE PARTS - OT SERIES CONTINUED

### Recommended Spare Parts – OT Series

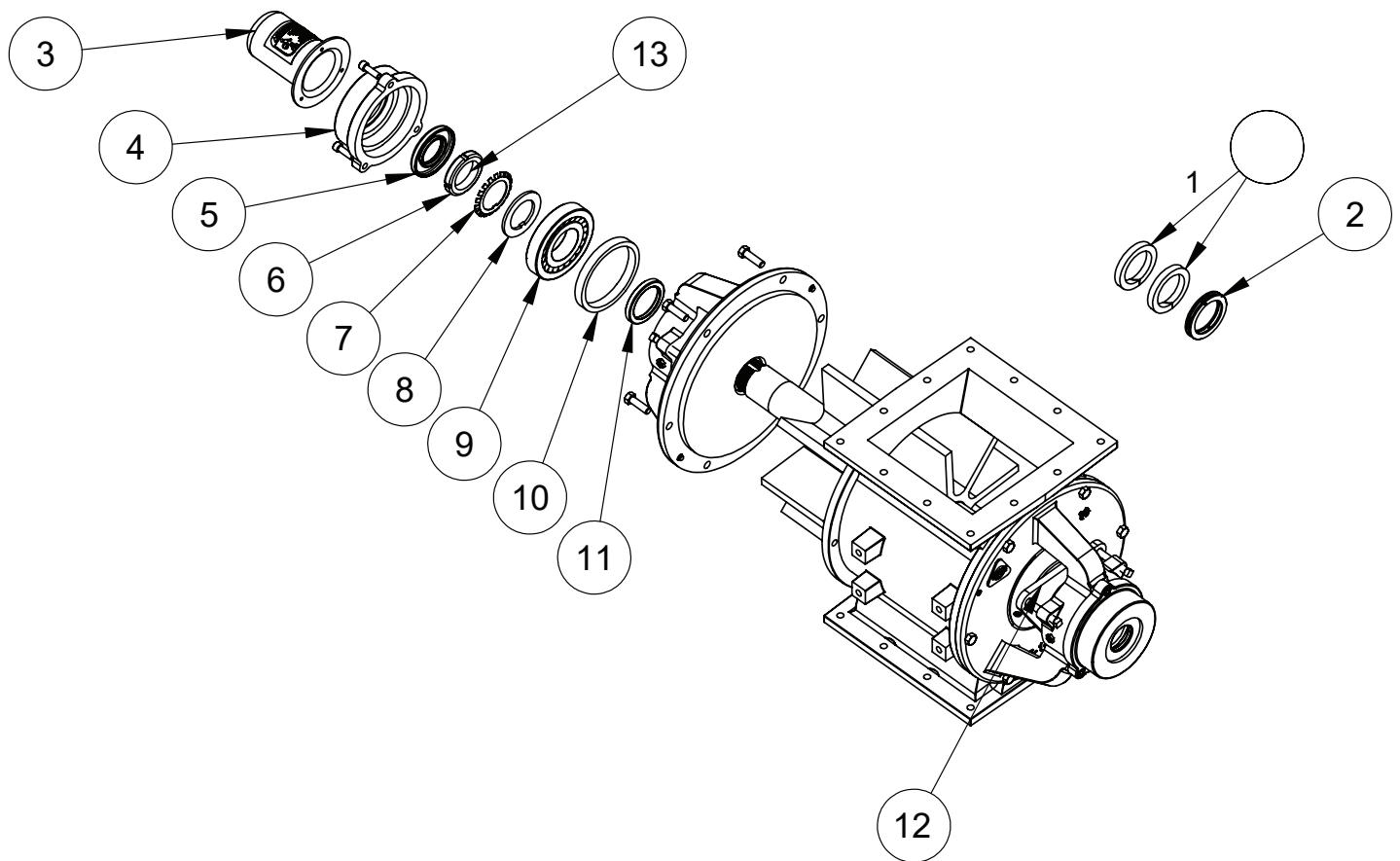
Description	Kice Part Number	Applicable Airlocks
Bearing Cup	394A	All
Bearing Cone	396	Ø8 thru Ø12" body
Bearing Cone	395A	Ø14 thru Ø24" body
Bearing Lock Washer	TW109	Ø8 thru Ø12" body
Bearing Lock Washer	TW-113	Ø14" thru Ø24" body
End Cap Radial Shaft Seal	CR15241	Ø8 thru Ø12" body
End Cap Radial Shaft Seal	CR21759	Ø14" thru Ø24" body
Bearing Support Radial Shaft Seal	CR19607	Ø8 thru Ø12" body
Bearing Support Radial Shaft Seal	CR26123	Ø14" thru Ø20" body
Bearing Support Radial Shaft Seal	CR33645	Ø24" body
Small Body Airlock Packing	RAV-2908-3100	Ø8 thru Ø12" body
Medium Body Airlock Packing	RAV-2914-3100	Ø14" thru Ø20" body
Large Body Airlock Packing	RAV-2918-3100	Ø18" VPOT and all Ø24" bodies

**NOTICE:** There are no suitable alternatives to the bearing cup and cones shown. Use only those specified by Kice Industries.

## RECOMMENDED SPARE PARTS - OT SERIES CONTINUED

### Exploded View – OT Series

Drives are not shown for VJOT Airlocks due to historic variations in selection. Please contact Kice Industries, Inc. for drive related questions and provide the representative the airlock job number, serial number and any known post production modifications.



## RECOMMENDED SPARE PARTS - OT SERIES CONTINUED

Balloon #	Description	Kice Part #	Applicable Size
1	Small Body Airlock Packing	RAV-2908-3100	Ø8" thru Ø12" body
1	Medium Body Airlock Packing	RAV-2914-3100	Ø14" thru Ø20" body
1	Large Body Airlock Packing	RAV-2918-3100	Ø18" VPOT and all Ø24" bodies
2	Small Body Airlock Lantern Ring	RAV-2908-2120	Ø8" thru Ø12" body
2	Medium Body Airlock Lantern Ring	RAV-2914-2120	Ø14" thru Ø20" body
2	Large Body Airlock Lantern Ring	RAV-2918-2120	Ø18" VPOT and all Ø24" bodies
3	Shaft Guard w/ Rotating Parts Warning Decal	SO SHAFT GUARD EMC253x2-3	Ø8 thru Ø12" body
3	Shaft Guard w/ Rotating Parts Warning Decal	LO SHAFT GUARD EMC253x2-3	Ø14 thru Ø24" body
4	End Cap Radial Shaft Seal	CR15241	Ø8" thru Ø12" body
4	End Cap Radial Shaft Seal	CR21759	Ø14" thru Ø24" body
5	Bearing Lock Washer	TW109	Ø8 thru Ø12" body
5	Bearing Lock Washer	TW-113	Ø14 thru Ø24" body
6	Bearing Cup	394A	All
7	Bearing Spacer	Outboard Spacer	All
8	End Cap	F-1428M	All
9	Bearing Lock Nut	N-09	Ø8 thru Ø12" body
9	Bearing Lock Nut	N-13	Ø14 thru Ø24" body
10	Tongue Washer	K-91509	Ø8 thru Ø12" body
10	Tongue Washer	K-91513	Ø14 thru Ø24" body
11	Bearing Support Radial Shaft Seal	CR19607	Ø8 thru Ø12" body
11	Bearing Support Radial Shaft Seal	CR26123	Ø14 thru Ø20" body
11	Bearing Support Radial Shaft Seal	CR33645	Ø24" body
12	Small Body Airlock Packing Retainer	F-1430M-1	Ø8 thru Ø12" body
12	Medium Body Airlock Packing Retainer	F-1430M-2	Ø14 thru Ø20" body
12	Large Body Airlock Packing Retainer	F-1430M-3	Ø18" VPOT and all Ø24" bodies
13	Bearing Cone	396	Ø8 thru Ø12" body
13	Bearing Cone	395A	Ø14 thru Ø24" body



## 9. SPECIAL ATEX INFORMATION

The outside of the Rotary Airlock Valve is intended for use in areas in which explosive atmospheres caused by air/dusts mixtures are unlikely to occur or, if they do occur, are likely to do so only infrequently and for a short period only.

The inside of the Rotary Airlock Valve is intended for use withstanding an atmosphere where dust clouds are likely to be present occasionally during normal operation.

**When installing an electric motor and other electric or non-electric equipment on the rotary airlock valve, be sure that all those components are suitable for being operated in zone 22, meaning they must fulfil the ATEX-requirements for Group II category 3D equipment.**

Potentially dangerous situation during installation and initial start up	Measures that must be applied by the user during installation and initial start up
Sparking in the event of transport accidents.	The rotary airlock valve or the components of the rotary airlock valve must not be dropped during transport – not only because of the risk of personal injury but also due to the risk of sparks being produced.
Welding as a source of sparks.	Welding is not permitted in zones 0, 1 or 2. Bolted connections must be used instead.
Overheat situation of the rotary airlock valve.	The maximum permitted rotation speed of the rotary airlock valve is 30 r.p.m. (or relative contact speed must be < 1 m/s). An overheat situation due to increased friction in zone 22 must be avoided in any case.
Use of non-explosion protected tools when dismantling or assembling the rotary airlock valve.	Only explosion-protected, non-sparking tools must be used when dismantling or assembling the rotary airlock valve.
Build-up of electrostatic charges at all non-earthed (non-grounded) enclosure parts.	During on-site installation, an external grounding wire must be connected to the rotary airlock valve.
Danger of sparking inside the rotary airlock valve when foreign particles, such as stones, metal pieces enter the machine.	Only clean product may be used. Foreign particles such as stones, ferromagnetic metal pieces and nonferromagnetic metal pieces NEVER may pass the rotary airlock valve.

Potentially dangerous situation during operation	Measures that must be applied by the user during operation
In some installations where combustible dust is present, it can deposit and build up on the external surfaces or in narrow gaps of the rotary airlock valve. That can have an insulating effect and prevent heat produced inside the rotary airlock valve from adequately dissipating from its surfaces. The combustible dust could ignite as a consequence.	The exterior surfaces of the rotary airlock valve must be cleaned periodically, when it is located in a dusty environment. Cleaning is to be done either with a vacuum cleaner approved for use in explosive zones, or with a damp cloth. Solvents or dry wool cloths (risk of sparking) must never be used.



## SPECIAL ATEX INFORMATION CONTINUED

Potentially dangerous situation during maintenance and repair	Measures that must be applied by the user during maintenance and repair
<p>Hazard: When components and connecting parts fail to function properly during their expected service life. The following parts must be replaced at certain intervals:</p> <ul style="list-style-type: none"><li>• Replacing the bearings in the rotary airlock valve.</li><li>• Replace the bearings in the electric motor.</li><li>• Replace the clutch between motor and rotary airlock valve (in case there is one).</li></ul>	<p>The bearings must be replaced after having finished 90% of their lifetime: this is every 12,000 hours of operation, preferably by authorized KICE service personnel. Those exchange intervals are calculated to ensure that overheating or sparking as a result of a defective wearing part can be practically excluded. It is recommended that the User installs an operating hour counter in the control cabinet if the operating hours cannot be easily determined by other means.</p> <p>The bearings must be replaced according to the specifications of the manufacturer of the electric motor.</p> <p>The clutch must be replaced according to the specifications of the manufacturer of the clutch.</p>
<p>Danger of sparking inside the rotary airlock valve when foreign particles, such metal pieces are inside the machine.</p>	<p>When replacing parts inside the rotary airlock valve, all bolts and nuts should be locked with Loctite® or a similar adhesive.</p>

### Installation Requirements

When installing equipment, make sure that the moving parts inside the rotary airlock valve are not accessible so that EN ISO 13857-1 is fulfilled.

Free outlet of the product must be guaranteed at all times, otherwise blockage and severe damage is possible.

Examined raw materials must be used; only pre-cleaned product that has passed a non-ferrous metal separator, a magnet separator and a contaminant separator may be used.

### Electrical Requirements

Electrical installation must be executed according to EN ISO 60204-1 (a lockable all-phase power switching device must be provided, so the device can be switched off and secured before performing repair work).

Construction of the control system must be done under consideration of EN ISO 13849-1.

Electrical components must be mounted by EMC skilled specialists.

## INSTALLATION REQUIREMENTS CONTINUED

### Installation Requirements

The operator or manufacturer of the facility must install an Emergency Stop circuit near the equipment, which is capable of turning off the machine immediately and securely under consideration of EN 13850. The safety circuit “EMERGENCY STOP button -> safety relay -> safe shut down of the drive motor (e.g. by means of motor protection switch)” must at least have performance level PL r=c according to EN ISO 13849-1.

During installation, an electrical repair switch must be installed in order to disconnect the motor, on all poles, from the power supply for service and maintenance activities to eliminate any personnel hazard. The safety circuit “repair switch -> safe shutting down of the drive motor (e.g. by means of motor protection switch)” must at least have performance level PL r=c according to EN ISO 13849-1.

Unless otherwise specified, the airlock speed sensor is provided by the customer.

### Grounding (Earthing) of Conducting Parts

It is normally sufficient to separately ground the static parts of the airlock when installed. If necessary, shaft grounding systems may be used. (This is to avoid any electrostatic charge and potentially dangerous situation).

### Markings

The nameplate shall be fixed permanently to the airlock and indicate: Name and address of the manufacturer, date of construction, designation or type of airlock, serial or identification number, the CE mark and classification markings.



Inside: II 2D c 85°C X/Outside: II 3D c 85°C X

## 10. TORQUE VALUES FOR MAINTENANCE AND INSTALLATION

<b>Recommended U.S. BOLT TORQUE*</b> <i>Coarse thread only</i>							
		SAE Grade 5	SAE Grade 5	SAE Grade 8	SAE Grade 8	Socket head cap screw	Socket head cap screw
Bolt Dia.	Thread Size	lb – ft	N – m	lb – ft	N – m	lb – ft	N – m
1/4	20	8.4	11	12	16	11	15
5/16	18	17	24	25	33	23	31
3/8	16	31	42	44	59	41	55
7/16	14	49	67	70	95	65	89
1/2	13	74	100	110	140	100	140
9/16	12	100	140	150	210	140	200
5/8	11	140	190	210	290	200	270
3/4	10	240	330	380	510	350	480
7/8	9	390	520	610	820	570	770
1	8	570	780	910	1100	850	1200
1-1/8	7	790	1100	1300	1700		
1-1/4	7	1100	1500	1800	2500		
1-3/8	6	1500	2000	2400	3200		
1-1/2	6	1900	2600	3200	4300		
1-5/8	5.5	2400	3300	4300	5900		
1-3/4	5	3000	4100	5000	6800		
2	4.5	4500	6100	7500	10000		

\*Values above are approximations; consult with the manufacturer for torque data.  
Significant variation may exist within the same grade and size between manufacturers.

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