

## Diverter Valve

### 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:



Inside: II 2D Ex h IIIB T85 °C Db 5 °C ≤ T<sub>amb</sub> ≤ 35 °C  
Outside: II 3D Ex h IIIB T85 °C Dc 5 °C ≤ T<sub>amb</sub> ≤ 35 °C  
Technical File No. 235/14\_E1

# 1. INTRODUCTION

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## **CONGRATULATIONS**

When you purchased your Kice heavy duty two way or three way diverter valve or bin fill valve, you bought a valve that has proven its reliability based on hundreds of installations and years of dependable service.

We are proud of our products and the people at Kice who build them. At Kice, the manufacturing process starts in our own foundry by following the construction standards and manufacturing techniques that have proven superior over the last 60 years.

The results of our development work and input from users have resulted in the present design of the Kice diverter valves.

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

Sincerely,

Drew Kice  
President  
Kice Industries, Inc.

## **Warranty**

The Company warrants the equipment manufactured by the Company to be free of defects in material and workmanship for a period of one (1) year from the date of shipment. Kice agrees to repair or replace, at its option, any parts found to be defective in the opinion of the Company. Kice 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, erosion, abuse or misuse of the product. Assistance by Kice in system layout or selecting equipment does not imply Kice's responsibility.

Buyer agrees to look to the warranty, if any, of the manufacturer or supplier of equipment manufactured by others and supplied by Kice for any alleged defects in such equipment, and for any damages or injuries caused thereby or as a result thereof. Where work is made to measurements or specifications furnished by the Buyer, Kice does not assume any responsibility for the accuracy of Buyer's specifications. Kice will not assume responsibility for alteration or repairs unless the same are made with the written consent and approval of Kice.

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

Kice extends no other warranty for any of its products other than the above express warranty, and there are not other warranties, express or implied, including warranties of merchantability, fitness for a particular purpose or otherwise which extend beyond the above limited express warranty. Kice and its dealers shall not in any event be liable for consequential or incidental damages, and the terms and conditions stated herein provides Buyer'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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### IMPORTANT

Write down the MODEL and SERIAL NUMBER of the Kice valve, along with the information for the auxiliary equipment (i.e., operators, valves, position switch, etc.).

For additional information, application assistance or special service, you should contact the factory. We will need to know the MODEL and SERIAL NUMBER of your Kice diverter valve. 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 the model and serial number.

Model:

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Serial Number:

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Date of delivery or installation:

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## 2. GENERAL INFORMATION

The purpose of this manual is to assist owners and operators in maintaining and operating the Kice diverter valve or bin fill valve. Please read it carefully; the information and instructions furnished can help you achieve years of dependable performance. Separate manuals may be required for the auxiliary equipment that make up the controls for the valve, such as, the solenoid operated valve or the position switch. They contain additional information that may not be repeated in this manual. You are urged to read all manuals before attempting any operation or repair of the equipment in the system. If these manuals are not included in your owner's packet, contact our customer service department.

### USING THIS MANUAL

General operation, adjustment and maintenance guidelines are outlined for owners and operators of the Kice diverter valve or bin fill valve. 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 term "disconnect and lockout" as used in this manual means that power (electric and/or air) to the equipment has been disconnected through the use of a pad-lockable, manual power cutoff, or power lockout switch.

Directions used in this manual, for example RIGHT or LEFT, CLOCKWISE, or COUNTERCLOCKWISE, refer to directions when facing the controls mounted on the side of the diverter valve with the inlet to the left and the outlets to the right.

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

### MODEL AND SERIAL NUMBER

The model of the diverter valve and bin fill valve and the serial number can be found on the stamped metal identification plate located on the end plate of the valve (see Figure 1).

**Left Plate (Blue background):**

KICE INDUSTRIES, INC.  
5500 N. MILL HEIGHTS DR.  
WICHITA, KS 67219  
U.S.A.

P: (316) 744-7151  
www.kice.com

MODEL:

SERIAL:

DATE:

**Right Plate (White background):**

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

Technical File No. 235/14\_E1

CE Inside: II 2D Ex h IIIB T85 °C Db 5 °C ≤ Tamb ≤ 35 °C  
Outside: II 3D Ex h IIIB T85 °C Dc 5 °C ≤ Tamb ≤ 35 °C

CONFIGURATION  
Diverter Valve

FIGURE-TYPE NO.	SERIAL NO.
<input type="text"/>	<input type="text"/>
DRAWING / SPEC NO.	MONTH-YR MANUFACTURED
<input type="text"/>	<input type="text"/>

Figure 1

## **GENERAL INFORMATION CONTINUED**

### **KICE DIVERTER VALVE PARTS AND SERVICE**

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

Correct part description and number, as given in the Illustrated Parts Lists section of this manual

Correct model number

Correct serial number

For assistance in service or ordering parts, contact the customer service department:

**Kice Industries, Inc.  
5500 Mill Heights Drive  
Wichita, KS 67219-2358  
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 Kice diverter valve is designed to be used in a specific type of system. Using the Kice diverter valve for a purpose other than that for which it was designed could result in personal injury, as well as, product or property damage.

### **FOR PURCHASED PARTS AND SERVICE**

Purchased items (such as, position switches, solenoid valves, pneumatic cylinders, pneumatic rotary actuators, and electric actuators) are covered by the manufacturer's warranty. If there is a problem with a purchased item, it may be quicker to check with the local supplier or service representative.

### 3. SAFETY PRECAUTIONS

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Figure 2

This safety alert symbol is used on equipment, safety decals and in manuals to call your attention to an important safety message warning you of possible danger to your personal safety. When you see this symbol (Figure 2), be alert; your personal safety or the safety of other persons is involved. Follow the instructions in the safety message.

#### 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.



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

#### SAFETY DECALS

The safety decals on the diverter valve should not be removed, covered over, painted, or otherwise become illegible. If this occurs, the decals should be replaced immediately. Contact our customer service department for replacements.

## SAFETY PRECAUTIONS CONTINUED

### ADDITIONAL SAFETY PRECAUTIONS:

- Do not attempt to install, connect power to, operate or service your new diverter valve without proper instruction and until you have been thoroughly trained in its use by your employer.
- Do not attempt to work on, clean or service the diverter valve, or open or remove any protective cover, guard, grate or maintenance panel until the POWER has been turned off and LOCKED OUT.
- Do not manually override or electrically bypass any protective device.
- Do not connect power to or operate the diverter valve unless all moving parts are covered and all covers, guards, grates and maintenance panels are in place and securely fastened.
- Do not abuse, overload, mistreat or misuse the diverter valve or attempt to operate the diverter valve and bin fill valve if it is in need of service, lubrication, maintenance or repair.
- Never place any part of your body near rotating members or moving parts of the diverter valve or air cylinder.
- If the diverter valve is not equipped with factory supplied guards, then all moving components must be completely enclosed before connecting power and before operation.
- For valves with electrical drives, a repair switch must be installed. For valves with pneumatic drive devices, a shutoff valve must be installed.
- If the diverter valve is equipped with a maintenance panel or access door incorporating a Protective Interlocking Limit Switch (PLS), the PLS must be interlocked with all electrical controls. This is to prevent all motors or powered devices on the unit from being energized if any protective cover, guard, grate or maintenance panel is open or removed. Never attempt to manually override or electrically bypass a safety device. The interlock function of the PLS must be tested and logged daily by supervisory personnel.
- Diverter valves must be equipped with a properly functioning Protective Interlocking Electrical Control Switch (PCS), a Pad-lockable Manual Power Lockout Switch, and with the other basic safety equipment listed above. On-off, interlock and padlock functions of the PCS must be tested and logged daily by supervisory personnel.
- Many diverter valves are installed and wired to divert automatically or be controlled from remote locations. Keep clear of all moving parts on industrial equipment at all times.
- It is the owner's and the employer's responsibility to adequately train the employee-operator in the proper and safe use of the equipment. Written safety programs and formal instruction are essential. All new employees must be made aware of company policies and operating rules, especially the established safety and health procedures. Refresher training of experienced employees in the potential hazards of the job is important. Up-to-date training records must be maintained at the job site.
- Special attention must be devoted to outside contractors engaged to enter and perform work on equipment or in the workplace. Special care must be exercised to insure all such personnel are fully informed of the potential hazards and follow plant rules – with special emphasis on explosion proof electrical tools and cutting or welding in unsafe environments.
- Keep the workplace cleaned up and free of dirt and dust at all times. Do not attempt to work on slippery or unsafe ladders or work platforms when maintenance or repair work is being performed on the diverter valve.
- Do not climb on ladders or work on platforms unless maximum load rating is posted. Do not exceed maximum load ratings when installing or servicing the diverter valve.
- Free outlet of the product must be guaranteed at all times, otherwise blockage and severe damage is possible.
- Only clean product (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. Foreign particles such as stones, ferromagnetic metal pieces and non-ferromagnetic metal pieces must NEVER enter the diverter or bin fill valve while in operation.
- All diverter valve inlet and discharge openings must be completely connected to the piping system to prevent human access while the equipment is operating, and must remain connected until POWER IS TURNED OFF AND LOCKED OUT. Keep away from the moving parts of the diverter valve during operation.
- Operate safely at all times. Use personal protective equipment when and where appropriate, such as hard hats, helmets, gloves, earplugs, dust masks and eye protection devices. Keep personal protective equipment in good repair and convenient to the operator.
- High voltage and rotating parts can cause serious or fatal injury. Only qualified, trained, and experienced personnel should perform installation, operation and maintenance of electrical machinery. Make sure that the diverter valve is effectively grounded in accordance with OSHA safety and health standards, the National Electrical Code or applicable local codes.
- The diverter and bin fill valves must be lifted by means of a lifting gear with sufficient capacity. Never stand under or near any kind of hoist or lifting mechanism, whether it is in operation or not.
- Qualified personnel, before each use, must carefully inspect all lifting devices. Never use a lifting device to transport equipment. Never use a lifting device that is damaged, deteriorated, or in any way in need of repair.
- Operator must ensure that all piping and connections are laid away from access routes and steps to keep the area safe and accessible.
- Operator must also ensure that adequate lighting conditions are provided at the installation location to keep the area safe and accessible.
- All protective covers, guards, grates, maintenance panels, switches and warning decals must be kept in place and in good repair. Any equipment with a damaged, malfunctioning, defective, or missing protective device must be taken out of service until the protective device can be repaired or replaced.
- Any device powered by air or hydraulic pressure must be equipped with a properly functioning Pad-lockable Manual Pressure Lockout and Internal Pressure Relief Valve (PRV).
- Any diverter valve that is used in the processing of explosive materials in hazardous environments requires an evaluation on the part of the user and operator of proper and adequate monitoring equipment, dust control, explosion relief venting, and electrical equipment enclosures. Do not use your equipment in hazardous environments unless it has been properly equipped for the hazard.
- It is ultimately the operator's responsibility to implement the above listed precautions and insure proper equipment use, maintenance and lubrication. Keep these instructions and a 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 future or additional procedures.

**WORK SAFELY AT ALL TIMES!!!**

## 4. GENERAL RECEIVING, HANDLING AND INSTALLATION

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### RECEIVING AND INSPECTION

Kice Industries, Inc., has prepared your new diverter valve for shipment in accordance with the Uniform Freight Classification. The valve has been thoroughly inspected at the factory and, barring damage in transit, should be in excellent condition upon arrival.

The diverter valve and accessories should be inspected upon receipt for any shipping damage. If actuators or position switches are provided, check these accessories for free operation of all moving parts.

When a carrier signs the Kice Industries, Inc., bill of lading, the **carrier accepts the responsibility** for any subsequent shortages or damage, evident or concealed, and **any 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 of damage, evident or concealed, must be requested. After inspection, issue a purchase order for necessary parts or arrange for return of the equipment to Kice Industries, Inc., for repair.

### HANDLING AND STORAGE

Kice diverter valves are shipped in many different configurations. Some units are included with other equipment of the system, and some are completely assembled and skidded. These units may be handled and moved using good rigging techniques, being careful to avoid concentrated stresses that will distort any of the parts or guards.

If the diverter valve is not to be installed promptly, store it in a clean, dry location to prevent rust and corrosion of steel components. If outdoor storage is necessary, protection should be provided. Cover the inlet and outlets to prevent the accumulation of dirt and moisture inside the body. Cover the actuator and controls with waterproof material. Refer to the actuator maintenance information for further storage instructions.



**Caution:** Use proper equipment when lifting or moving the diverter valve. Make sure all persons and obstructions are clear from path and installation area.

### INSTALLATION

1. Before installing the diverter valve, it is recommended that it be bench tested. Test the diverter valve by energizing the solenoids of the 4-way valve, or (in the case of an electric actuator) by switching on the current to the electric motor. Keep clear of the rotor, the pneumatic cylinder lever arm, and any pinch points. If any unusual noises occur, disconnect and lock out the power. Check the clearances between the diverter valve end plates and rotor (the rotor could have shifted to one side during shipment).



**!!!WARNING!!!** When testing the diverter valve, care **MUST** be taken to keep objects and body parts out of the valve. The rotor operates with tight clearances and will move fast with force!!!

**Note:** To prevent the connection between the actuator and the rotor from failing, the speed at which the diverter valve operates **MUST** be regulated by the flow control valves located on the exhaust ports of the 4-way valve.

2. Move the diverter valve to the installation area using proper equipment. Diverter and Bin Fill Valves are best lifted with a strap across the endplates.

## GENERAL RECEIVING, HANDLING AND INSTALLATION CONTINUED

3. The diverter valve must be adequately supported in such a way that its weight is not transferred to the tubing or piping connected to the inlet and outlets of the valve. The diverter or bin fill valve must also be installed on steel structure design intended for this purpose. Failure to do so may result in incomplete rotation of the rotor, actuator coupling failure or actuator failure.

4. Compression couplings are normally used to connect the inlet and outlets of the diverter valve to the conveying line. Check the ends of the tubing or piping that will be connected to the diverter valve and make sure to clean any burrs and straighten any dents. Make sure the gap between the diverter valve and the tubing or piping is small (less than ¼ inch). When installing the couplings, check the coupling gaskets to make sure they do not protrude into the air stream.



**REMEMBER: Couplings are used to seal the joint, not support the equipment.**

5. Tighten all mounting fasteners securely. To insure proper operation, the diverter valve must be adequately supported and properly installed. All tubing or piping connected to the diverter valve should be independently supported, as excess weight may distort the diverter valve body and cause contact between moving parts. When installing outdoors, care must be taken to protect the controls from the weather.

6. If the diverter valve is air actuated, connect the high pressure air supply to the 4-way valve.

7. Connect the electrical control lines to the solenoids on the 4-way valve and to the position switches.

8. If equipped with an electric actuator, connect the electrical power lines and the control lines to the electric actuator and the position switches (there are no air connections with an electric actuator).



**!!!WARNING!!! High voltage and rotating parts can cause serious or fatal injury. Only qualified personnel should perform installation, operation and maintenance of electrical machinery. Make sure that any electric motor and the frame of the diverter valve is effectively grounded in accordance with OSHA standards, the National Electrical Code or applicable local codes.**

9. Wiring from the controller to the solenoids should be #18 gauge.

10. Test the valve after installation by energizing the solenoids of the 4-way valve, or (in the case of an electric actuator) by switching on the current to the electric motor. Keep clear of the pneumatic cylinder lever arm and any pinch points. If any unusual noises occur, disconnect and lock out the power. Check the clearances between the diverter valve end plates and rotor (the rotor could have shifted to one side during installation).

**NOTE:** There is the possibility (especially with larger diverter valves) that, if a diverter valve is installed on its side (with the shaft pointing up), the weight of the rotor could cause the rotor to slip down against the lower end plate. If this occurs, contact a Kice representative. If specified at the time of order that the diverter valve would be installed in such a manner, a Teflon spacer could be inserted between the rotor and end plate to prevent the possibility of such a shift.

11. Reinstall any guards or covers removed during installation.

12. All Kice diverter valves have two threaded ports in each end plate, either of which can be used for back pressure purging the void between the closed end rotor and the end plate. If the diverter valve is being used in an application that requires back pressure purge, remove one of the two plugs and connect plant air to each end plate. Adjust the air pressure with a regulator to at least 2 PSIG higher than the pressure inside the conveying line. The void can also be grease packed. If specified at the time of order,

## OPERATION AND START-UP PROCEDURE CONTINUED

one of the 1/8" NPT openings will be fitted with a grease zerk and the void will be packed with food grade lubricant before the diverter valve is shipped from the factory. The purge air or the grease pack is used to prevent the conveyed product from accumulating between the closed end rotor and the end plates of the diverter valve.

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## 5. OPERATION AND START-UP PROCEDURE

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**!!!WARNING!!! When testing the diverter valve, care MUST be taken to keep objects and body parts out of the valve. The rotor operates with tight clearances and will move fast with force!!!**

The key to long and trouble free diverter valve operation is good maintenance practices. Periodically inspect the rotor for damage from foreign materials or wear. Inspect the bearings and the valve control system for excessive wear or loose connections.

A majority of the operating problems that occur with a diverter valve 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 diverter valve is a must 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.

### MANUALLY OPERATED DIVERTER VALVES

1. Be certain that the manual operating lever will be readily accessible to the operator when changing the valve position. The operating lever travel must be unobstructed.
2. When the diverter valve installation is completed, check for satisfactory operation.

### AIR ACTUATED DIVERTER VALVES

1. Check the limit switch adjustment. Switches should actuate whenever the rotor completes its travel. On diverter valves with rotary actuators, adjustments are made by removing the cover from the limit switch housing and rotating the cam corresponding to the switch requiring adjustment (see the limit switch instruction sheet for further details). On diverter valves with pneumatic cylinders, adjustments are made by repositioning the lever arm on the limit switch.

**NOTE:** Limit switches are used to indicate the position of the rotor, and often are used with indicator lights. They are in no way related to the function of the solenoid valve.

2. Terminate all diverter valve electrical connections to its control panel. Note the voltage rating on the solenoid valve data plate.
3. Connect the diverter valve to the compressed air supply. Clean, dry, non-lubricated air at 100 PSIG is required for the 4-way valve and the actuator. The air regulator should be no more than 10 feet from the actuator.
4. The purge air for the end plates of the diverter valve should be clean, dry and non-lubricated air.

## OPERATION AND START-UP PROCEDURE CONTINUED

5. When the diverter valve installation is completed, check for satisfactory operation and correct positioning. If the rotor does not position correctly, adjustment can be made by adjusting the travel stop located in the end cap of the rotary actuator, or by adjusting the jam nut and clevis on pneumatic cylinders. If positioning is opposite of what is desired, reverse the air lines on the actuator side on the solenoid valve. On rotary actuators, reverse the signal lines from the control panel to the solenoids. If panel lights do not indicate position correctly, reverse the limit switch wiring. Manually Operated Diverter Valves

1. When a change of diverter valve position is desired:
2. Pull the knurled knob to release the spring loaded, manually operated locking pin mounted on the operating lever.
3. Move the operating lever to the new position.
4. Release the spring loaded, manually operated knurled knob to engage the locking pin.

## AIR ACTUATED DIVERTER VALVES

When a change of diverter valve position is desired:

Sequence of events for **DOUBLE** solenoid operated 4-way valve.

1. Select the desired diverter valve position on the control panel.
2. Push the button to close the contacts that energize the solenoid operated 4-way valve.
3. Hold the push button down until the position light comes on.
4. Release the push button. This will deactivate the solenoid on the 4-way valve.

Sequence of events for **SINGLE** solenoid operated 4-way valve.

1. Select the desired diverter valve position on the control panel.
2. Energize the single solenoid operated 4-way valve by closing a two-position switch. To keep the diverter valve in the required position, the solenoid valve must be energized continuously.
3. To return the diverter valve to the original position, de-energize the solenoid. The spring in the 4-way valve will return the air actuator to the starting position.

**NOTE:** In the event of an electrical power interruption or a solenoid failure, the diverter valve position can be changed as follows:

- a. First try using the red manual override buttons on the 4-way valve



**IF THE AIR PRESSURE IS OFF, then –**

- b. Disconnect the compressed air supply from the solenoid valve.
- c. Change the diverter valve position by manually moving the lever arm connecting the pneumatic cylinder to the diverter valve shaft.

## 6. DIVERTER VALVE MAINTENANCE AND SERVICE

### LUBRICATION

1. The diverter valve bearings are permanently lubricated. Therefore, lubrication of the diverter valve is generally not required or recommended. Check the oil level in the lubricator bowl on the compressed air supply at regular intervals. **FILL AS REQUIRED!!!**
2. If the void between the rotor and the end plate is packed with grease, then one of the threaded ports in the end plate will have a grease zerk while the other will be plugged. Once a year, remove the plug and pump grease in through the grease zerk until excess grease is expelled through the open port.
3. Check the general condition of the diverter valve. Look for loose fasteners or signs of leakage.
4. Provide normal maintenance for the actuator, solenoid operated 4-way valve and positions switches.

### DISASSEMBLY

1. Remove guard.
2. Remove actuator, but leave coupling attached. This will keep the valve in position for proper alignment during re-assembly.
3. Remove guard back plate.
4. Remove diverter end plate.
5. Extract diverter rotor if necessary.

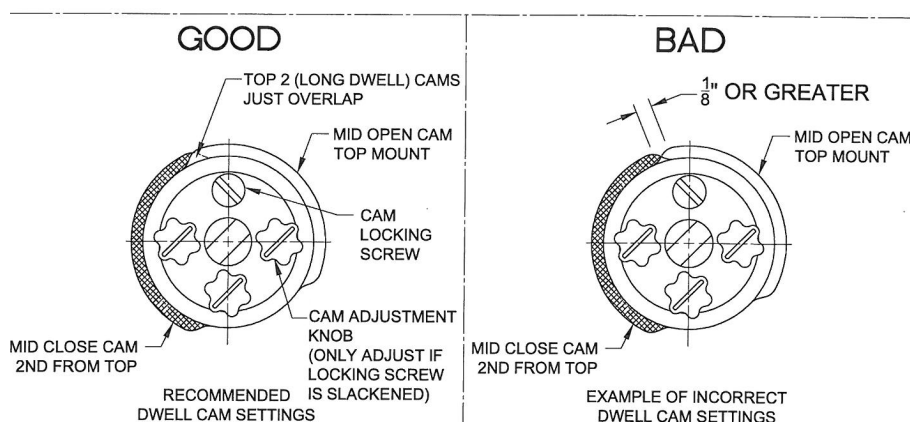
### Calibration and Set Up instructions for Bray Series 70 Actuators with special mid-travel limit switches for 3-position operation

This specially modified Bray Series 70 Actuator has been designed and manufactured with 4 limit switches to allow the unit to be controlled remotely and operate in 3 positions, open, closed and mid position. To allow this unit to be able to go from any one position to either of the other 2 positions, 4 switches are required. The switches are activated by 2 standard cams (open and closed positions) and 2 special long dwell cams (mid travel positions). After calibration, the 4 cams must be locked together by tightening the cam locking (slotted head) screw, to prevent the cams from drifting due to shock and vibration.

These instructions are a supplement to the standard Bray Series 70 Operation and Maintenance Manual. Please refer to those instructions and apply these instruction once those instructions have been followed.

**To prevent damage to the motor or the switches, the following instructions must be followed before power is applied to the unit.**

- 1) Before energizing the unit, follow the Series 70 OMM instructions setting the mechanical travel stops at open and closed end of travel.
- 2) Slacken the cam locking screw.
- 3) Adjust the open and close cams according to the instructions in the Series 70 OMM
- 4) Adjust the 2 mid-travel (the 2 uppermost) cams to the desired position. (see sketch for clarification).
- 5) Re-tighten the cam locking screw.
- 6) Energize unit and test operation



## DIVERTER VALVE MAINTENANCE AND SERVICE CONTINUED

## Manual DIV-M00

Diverter Valve Models											
	67Q2-2 - 67Q4-2	67Q5-2 / 67Q6-2	67Q8-2	67Q10-2 / 67Q12-2	67Q2-3 - 67Q4-3	67Q5-3 / 67Q6-3	67Q8-3	67Q10-3	68Q2 - 68Q4	68Q5 / 68Q6	
Bearings	WB219		WB223	WB231	WB219		WB223	WB231	WB219		
Seals	1154-3		1154-2	1154-1	1154-3		1154-2	1154-1	1154-3		
Pneumatic Rotary Actuator	10003368	10003369	10003370	N/A	N/A	N/A	N/A		10003368	10003369	
Electric Rotary Actuator	S70-0121	S70-0201	S70-0501		S70-0121	S70-0201	S70-0501		S70-0121	S70-0201	
Position Switch Options											
NEMA 4/4X/7/9		AFNB-E120		N/A	N/A	N/A	N/A	N/A	AFNB-E120		
IP 67					10003243*						
Class I/II Div I					10003241						
Solenoid Valve Options											
NEMA 4					LO703ABWWAA						
NEMA 7/9					LO703ABWW391AA						

\* Note: must also use conduit adapter 10003244 for Class II Div 2 area classification

## 7. TROUBLESHOOTING

PROBLEM	CAUSE	REPAIR	PREVENTION
Diverter valve position cannot be changed	<ul style="list-style-type: none"> <li>Rotor is rusted in place</li> </ul>	1. Remove diverter valve from conveying line if installed. 2. Disassemble diverter valve taking care not to damage any parts. 3. Remove accumulated rust.	<ul style="list-style-type: none"> <li>Move the rotor a minimum of once every 8 hours.</li> <li>Coat the rotor and body interior - This should be done at the factory to ensure proper appropriate finished clearances</li> </ul>
		1. Check for moisture in endplate purge air supply (if applied) 2. Restore compressed air dryer functionality	<ul style="list-style-type: none"> <li>Refine compressed air dryer PM schedule.</li> <li>Install 3 stage compressed air filter on diverter immediately before diverter compressed air inlet.</li> </ul>
	<ul style="list-style-type: none"> <li>Material is jammed between rotor and body</li> </ul>	1. Remove diverter valve from conveying line 2. Remove lodged material 3. Check for damage to rotor and body 4. Repair any damage 5. Reinstall and return to service.	
	<ul style="list-style-type: none"> <li>Interference caused by thermal expansion</li> </ul>	Reduce temperature difference between interior and exterior of the diverter valve. <ul style="list-style-type: none"> <li>Reduce conveying air temperature</li> <li>Insulate diverter valve body</li> </ul>	Reduce temperature difference between interior and exterior of the diverter valve. <ul style="list-style-type: none"> <li>Reduce conveying air temperature.</li> <li>Insulate diverter valve body</li> </ul>

## TROUBLESHOOTING CONTINUED

Incorrect rotor position	<ul style="list-style-type: none"> <li>Broken pneumatic actuator piston</li> </ul>	Replace actuator	Adjust exhaust mufflers mounted on solenoid valve to require one to two seconds to switch between position 1 and 2 - Faster actuation increases inertia causing the piston to slam into its mechanical stop and break the piston
	<ul style="list-style-type: none"> <li>Broken actuator coupling spring pin</li> </ul>	Replace spring pin	<p>Identify how the spring pin failed</p> <p>Spring pin sheared in two pieces - the hole is oversized</p>
	<ul style="list-style-type: none"> <li>Electric rotary actuator limit switches failed</li> </ul>	Replace limit switches	

## 8. SPECIAL ATEX INFORMATION

---

The outside of the Kice Diverter or Bin Fill 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 Kice Diverter or Bin Fill Valve is intended for use withstanding an atmosphere where dust clouds are likely to be present occasionally during normal operation.

### INSTALLATION REQUIREMENTS

When installing equipment, make sure that the moving parts inside the Diverter/Bin Fill Valve are not accessible so that EN ISO 13857-1 is fulfilled.

When installing an electric actuator, drive motor/gear unit combination, other electric or non-electric equipment on the diverter or bin fill valve, be sure that all those components are suitable for being operated in zone 22. Specifically, they must fulfil the ATEX-requirements for Group II category 3D equipment so that the formation of an electrically generated ignition source is not expected.

Suitable measuring, control and regulating devices (MCR) must be installed to ensure that the temperature of the device's interior never reaches the spontaneous ignition temperature of the product. The difference between the spontaneous ignition temperature and the product temperature must be at least 50 degrees centigrade.

The steel construction for installation of the appliance must be horizontal, stable and free from vibration. A constant temperature of 12-35 degrees centigrade must be maintained.

### 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 and in accordance with current guidelines and codes.

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 actuator 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.

### GROUNDING (EARTHING) OF CONDUCTING PARTS

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

## **SPECIAL ATEX INFORMATION CONTINUED**

### **OPERATION AND MAINTENANCE**

The exterior surfaces of the diverter or bin fill 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.

Hot surfaces or tight gaps between movable parts must be cleaned regularly by vacuuming and with a vacuum approved for use in explosive zones or with an anti-static cloth in order to prevent ignition of dust deposits.

The rotor bearings must be replaced after having finished 90% of their lifetime: 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.

Any present actuator or gear motor bearings must be replaced according to the specifications of the manufacturer (Category 3 GD for usage in Zone 22).

The service activities prescribed by the manufacturer of the actuator, gear motor or gearbox must be carried out according to schedule.

The service activities prescribed by the manufacturer of the coupling (if present) must be carried out according to schedule.

When assembling or reassembling any actuators, gear motors or couplings, exact alignment of shafts and drives must be maintained.

Electric driven appliances must not be used before the gearbox is filled with oil (if so equipped).

When replacing parts inside the diverter or bin fill valve, all bolts and nuts should be secured with Loctite® or a similar adhesive thread locker.

### **MARKINGS**

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



Inside: II 2D Ex h IIIB T85 °C Db 5 °C ≤ Tamb ≤ 35 °C

Outside: II 3D Ex h IIIB T85 °C Dc 5 °C ≤ Tamb ≤ 35 °C

Technical File No. 235/14\_E1

## 9. 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.

# 10. ILLUSTRATED PARTS LIST

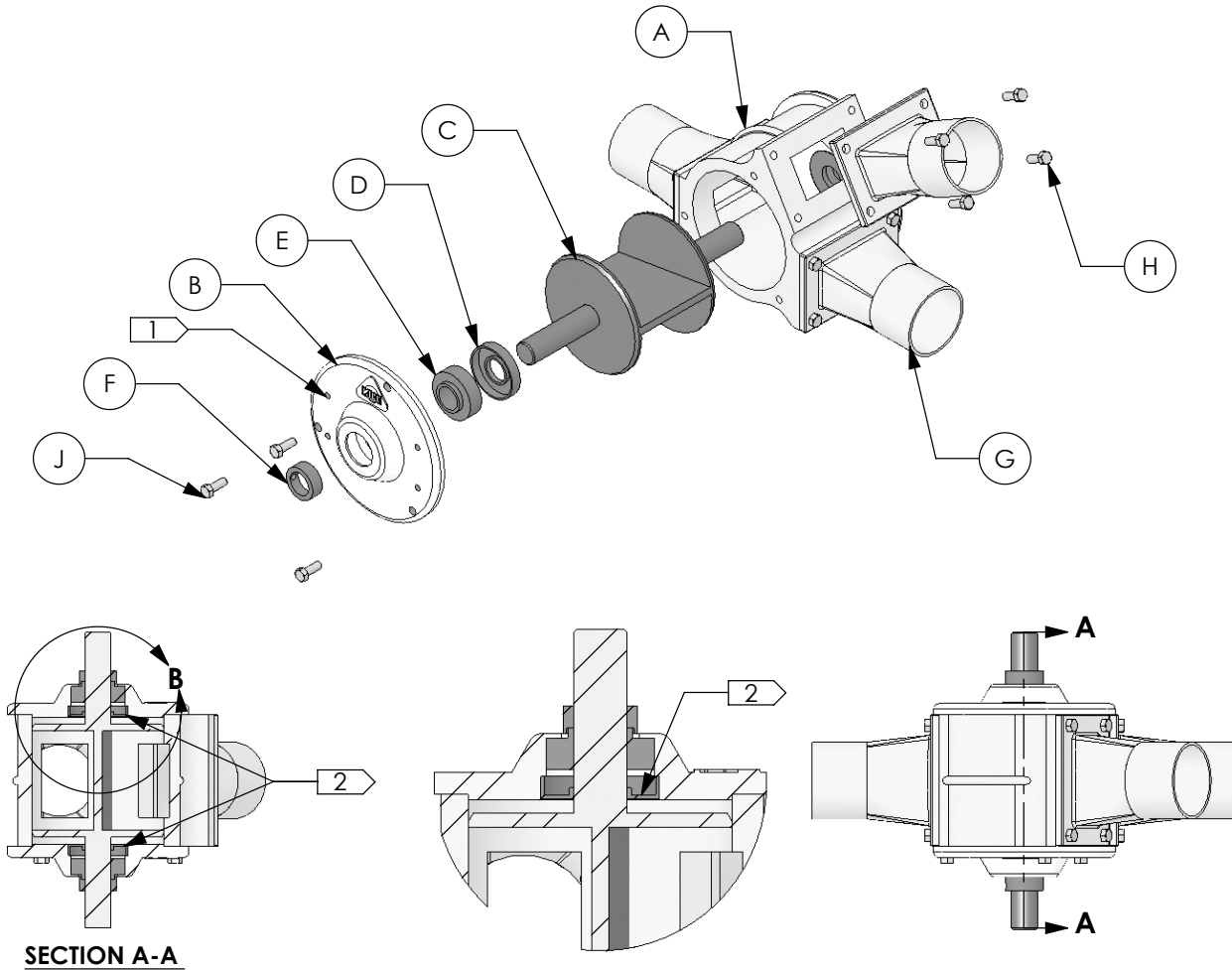
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ILLUSTRATED PARTS FOR 67QX-2 DIVERTER VALVE.....22  
DRAWING # DIV-5000

ILLUSTRATED PARTS FOR 67QX-3 DIVERTER VALVE.....23  
DRAWING # DIV-5001

ILLUSTRATED PARTS FOR 68QX BIN FILL VALVE.....24  
DRAWING # DIV-5002

BILL OF MATERIAL				
ITEM	DESCRIPTION	MODEL	PART NO.	QTY.
A	BODY	-	-	1
B	ENDPLATE	-	-	2
C	ROTOR	-	-	1
D	NTI, DOUBLE LIP SEAL	67Q2-2 THRU 67Q6-2	NT11154-3	2
	NTI, DOUBLE LIP SEAL	67Q8-2	NT11154-2	
E	LINK BELT, SEALED BALL BEARING	67Q2-2 THRU 67Q6-2	WB219-EL	2
	LINK BELT, SEALED BALL BEARING	67Q8-2	WB223-EL	
F	LINK BELT, SHAFT COLLAR	-	-	2
	- SUPPLIED w/ BEARING			
	- LOCKS ROTOR IN PLACE			
G	TRANSITION	-	-	3
H	HHCS, 3/8"-16 x 3/4"	67Q2-2 THRU 67Q3-2	-	12
	HHCS, 3/8"-16 x 1"	67Q4-2 THRU 67Q6-2		24
	HHCS, 3/8"-16 x 1"	67Q8-2		
J	HHCS, 3/8"-16 x 1"	67Q2-2 THRU 67Q3-2	-	6
	HHCS, 3/8"-16 x 1 1/4"	67Q4-2 THRU 67Q6-2		12
	HHCS, 3/8"-16 x 1 1/4"	67Q8-2		



#### GEN. NOTES

- 1 (2 EA.) 1/8" NPT PORT w/ PLUG (CAN BE USED FOR BACK PRESSURE PURGE OR LUBE) SHIPPED DRY-NO LUBE UNLESS REQUESTED.
- 2 BEARING & SEAL ASSEMBLY TO BE THE SAME BOTH END PLATES.

67Qx-2 WAY  
DIVERTER VALVE  
DESCRIPTION:



**KICE INDUSTRIES, INC.**

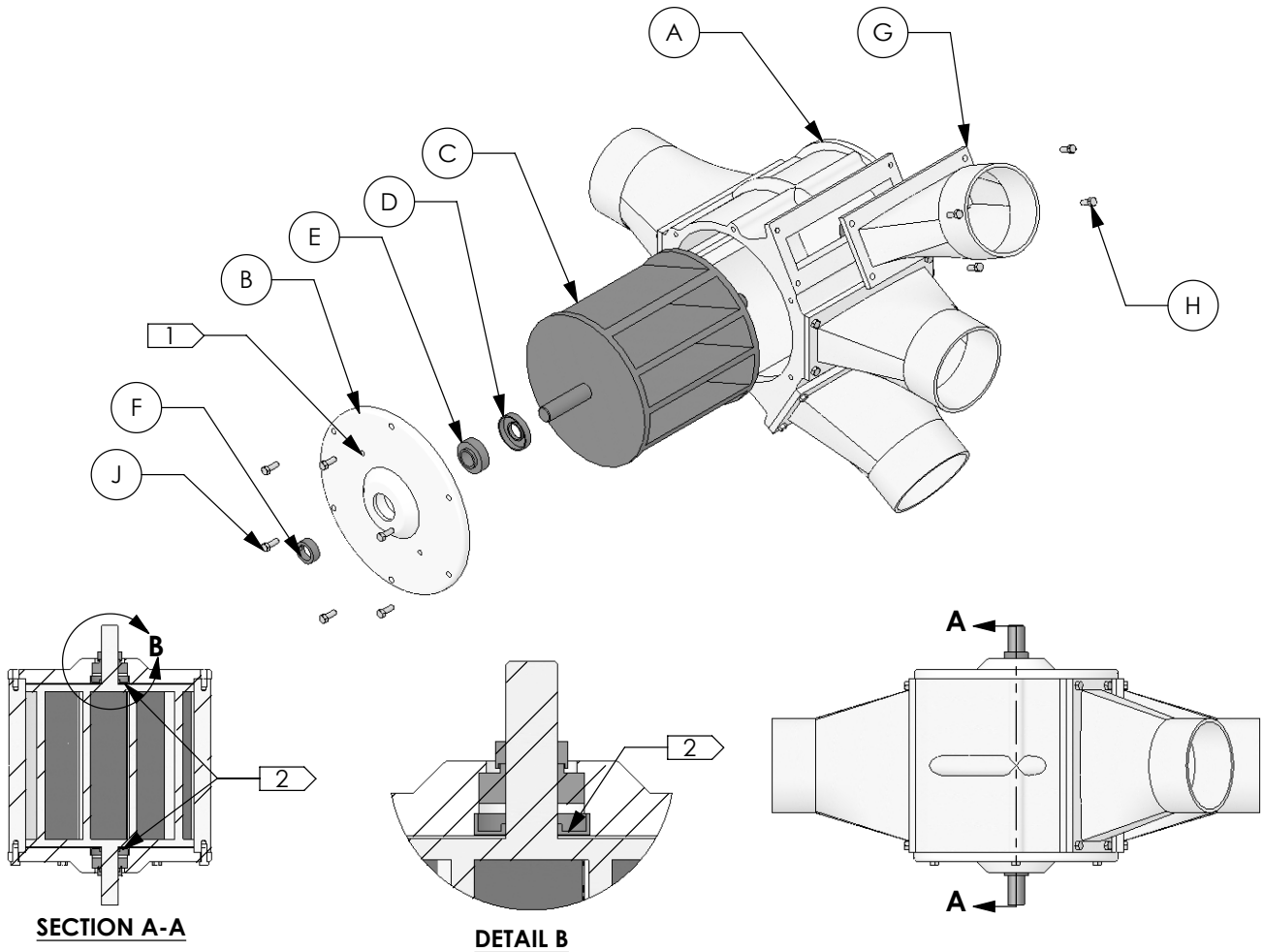
5500 MILL HEIGHTS DR. WICHITA, KANSAS 67219  
PH: (316) 744-7151 FAX: (316) 744- 7355

EJS  
DWN:

2/15/07  
DATE:

DIV-5000  
DWG. NO.

BILL OF MATERIAL				
ITEM	DESCRIPTION	MODEL	PART NO.	QTY.
A	BODY	-	-	1
B	ENPLATE	-	-	2
C	ROTOR	-	-	1
D	NTI, DOUBLE LIP SEAL	67Q2-3 THRU 67Q6-3	NT11154-3	2
	NTI, DOUBLE LIP SEAL	67Q8-3	NT11154-2	
E	LINK BELT, SEALED BALL BEARING	67Q2-3 THRU 67Q6-3	WB219-EL	2
	LINK BELT, SEALED BALL BEARING	67Q8-3	WB223-EL	
F	LINK BELT, SHAFT COLLAR	-	-	2
	- SUPPLIED w/ BEARING			
	- LOCKS ROTOR IN PLACE			
G	TRANSITION	-	-	4
H	HHCS, 3/8"-16 x 3/4"	67Q2-3 THRU 67Q3-3	-	16
	HHCS, 3/8"-16 x 1"	67Q4-3 THRU 67Q6-3		32
	HHCS, 3/8"-16 x 1"	67Q8-3		
J	HHCS, 3/8"-16 x 1"	67Q2-3 THRU 67Q6-3	-	12
	HHCS, 3/8"-16 x 1 1/4"	67Q8-3		16



#### GEN. NOTES

- 1 (2 EA.) 1/8" NPT PORT w/ PLUG (CAN BE USED FOR BACK PRESSURE PURGE OR LUBE) SHIPPED DRY-NO LUBE UNLESS REQUESTED.
- 2 BEARING & SEAL ASSEMBLY TO BE THE SAME BOTH END PLATES.

67Qx-3  
DIVERter VALVE  
DESCRIPTION:



**KICE INDUSTRIES, INC.**

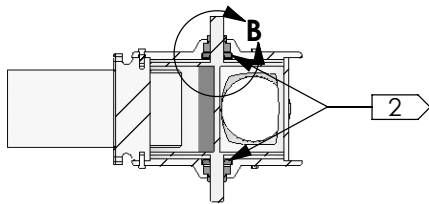
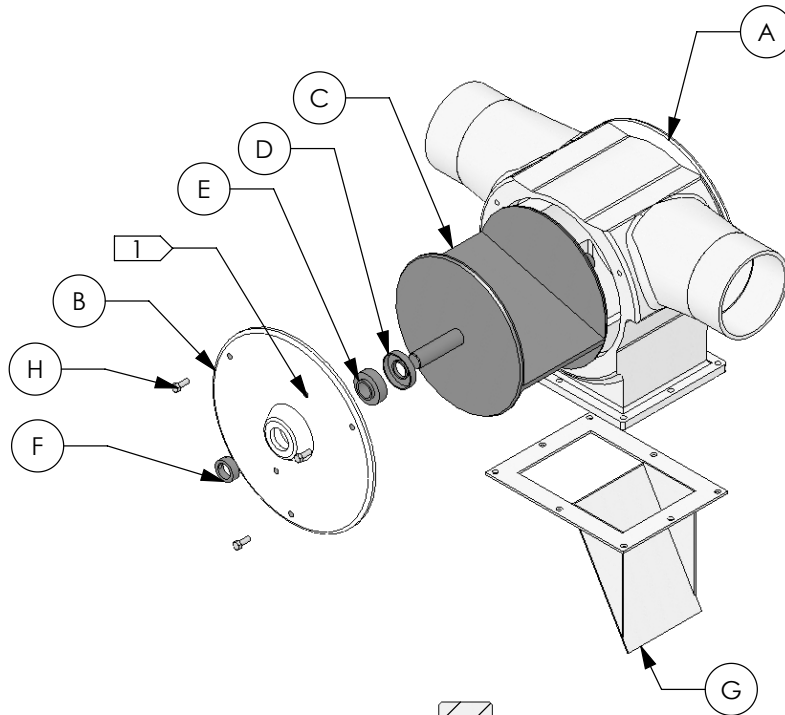
5500 MILL HEIGHTS DR. WICHITA, KANSAS 67219  
PH: (316) 744-7151 FAX: (316) 744-7355

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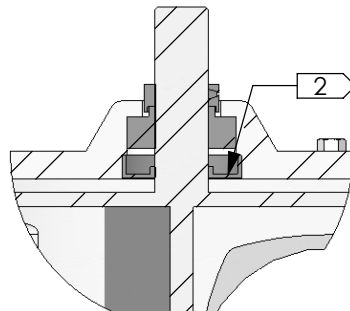
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DATE:

DIV-5001  
DWG. NO.

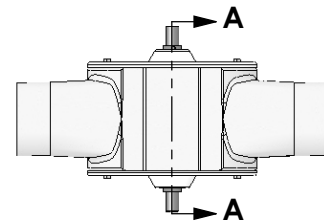
BILL OF MATERIAL				
ITEM	DESCRIPTION	MODEL	PART NO.	QTY.
A	BODY	-	-	1
B	ENPLATE	-	-	2
C	ROTOR	-	-	1
D	NTI, DOUBLE LIP SEAL	68Q2 THRU 68Q6	NTI1154-3	2
E	LINK BELT, SEALED BALL BEARING	68Q2 THRU 68Q6	WB219-EL	2
F	LINK BELT, SHAFT COLLAR	-	-	2
	- SUPPLIED w/ BEARING			
	- LOCKS ROTOR IN PLACE			
G	BAFFLE	-	-	1
H	HHCS, 3/8"-16 x 1"	68Q2 THRU 68Q6	-	6



**SECTION A-A**



**DETAIL B**



**GEN. NOTES**

- 1 (2 EA.) 1/8" NPT PORT w/ PLUG (CAN BE USED FOR BACK PRESSURE PURGE OR LUBE) SHIPPED DRY-NO LUBE UNLESS REQUESTED.
- 2 BEARING & SEAL ASSEMBLY TO BE THE SAME BOTH END PLATES.

68Qx  
BIN FILL VALVE  
DESCRIPTION:



**KICE INDUSTRIES, INC.**

5500 MILL HEIGHTS DR. WICHITA, KANSAS 67219  
PH: (316) 744-7151 FAX: (316) 744- 7355

EJS  
DWN:

2/15/07  
DATE:

DIV-5002  
DWG. NO.

## LEGEND

## SYMBOLS

# DRAWING ORDER

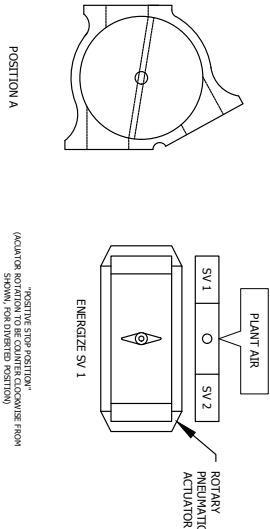
I/O WIRING COLOR KEY	
I/O NUMBER	WIRE COLOR

## WIRE COLOR KEY

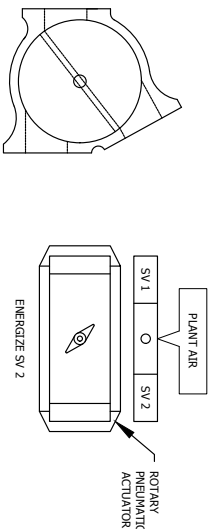
## MOTOR BRANCH CIRCUIT WIRING SYMBOLS

NONO4P - 4 POSITION SELECTOR SWITCH

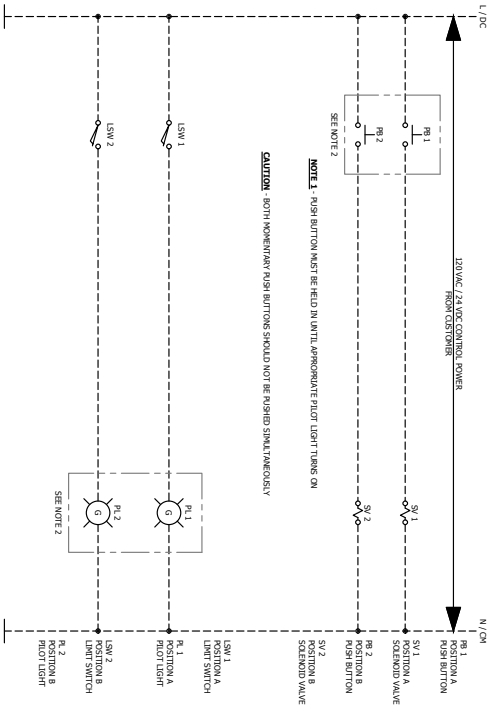
670X  
2-POSITION ROTARY AIR ACTUATOR & LIMIT SWITCHES



POSITION A  
"POSITIVE STOP POSITION"  
(ACTUATOR ROTATION TO BE COUNTER-CLOCKWISE FROM  
SHOWN, NON-COUNTER POSITION)



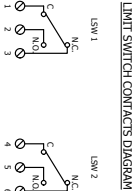
POSITION B



NOTE 1: PUSH BUTTON MUST BE HELD IN UNTIL APPROPRIATE PILOT LIGHT TURNS ON

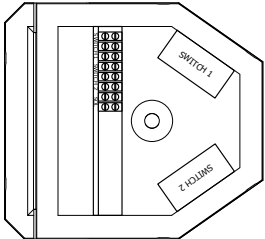
CAUTION: BOTH NON-REVERSARY PUSH BUTTONS SHOULD NOT BE PUSHED SIMULTANEOUSLY

NOTE 2: PUSH BUTTON AND PILOT LIGHT CONTROLS FURNISHED BY CUSTOMER OR AS AN OPTION PROVIDED BY KICE AUTOMATION



LIMIT SWITCH CONTACTS DIAGRAM

SWITCH BOX DETAIL



LIMIT SWITCH DATA

DESCRIPTION	FUNCTION	ELECTRICAL RATING	MANUFACTURER	CATALOG #
COUPLER 8026 SERIES	NORMALLY OPEN SPDT	15A @ 120/220VAC 2.5A @ 24VDC	OMRON	AMP-E120



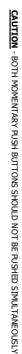
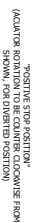
REVISIONS	DATE	DESCRIPTION
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## 67QX

C-1D

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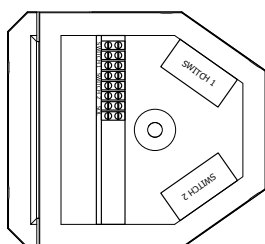
## 68QX



**NOTE 2 - PUSH BUTTON AND PILOT LIGHT CONTROLS FURNISHED BY CUSTOMER OR AS AN OPTION PROVIDED BY KICE AUTOMATION**



### SWITCH BOX DETAIL



### LIMIT SWITCH DATA

DESCRIPTION	FUNCTION	CATALOG #	
		MANUFACTURER	KIT#
CROAZLET 80.26 SERIES	NORMALLY OPEN SPOT	15A @120/250VAC	MONTIEUR
		2.5A @240DC	
			AFMB-EL20

SCHEMATIC LEGEND					
CONTRACT MODEL VARIATION					
FIELD VARIATION					
REVISIONS					
	DATE	DESCRIPTION	NO.		
JOB TITLE					
KICE INDUSTRIES WICHTA, KS					
DIVERSITY					
CUSTOMER NAME & LOCATION					
KICE INDUSTRIES WICHTA, KS					
SITE NAME & LOCATION					
KICE INDUSTRIES WICHTA, KS					
DATE	SHEET NUMBER				
12/21/20	STANDARD				
SCALE	PLOT SCALE				
NOT TO SCALE	1/1				
APPROVED BY	DRAWN BY				
LB	SS				
DWG. TITLE					
68 ROTARY AIR ACTUATOR & LIMIT SWITCHES					
DWG NO.					
C-3C					

## 68QX



DESCRIPTION	ELECTRICAL RATING	CATALOG #	MANUFACTURER
ELECTRIC ACTUATOR WITH INTERNAL SWITCHES	0.5 - 3.1A @120VAC 1.8 - 4.0A @240VDC	BRAY	570-XXX

[illegible]

**KICE INDUSTRIES, INC.**

5500 N. Mill Heights Dr.  
Wichita, KS 67219-2358  
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(F) 316.744.7355  
sales@kice.com

**kice.com**