

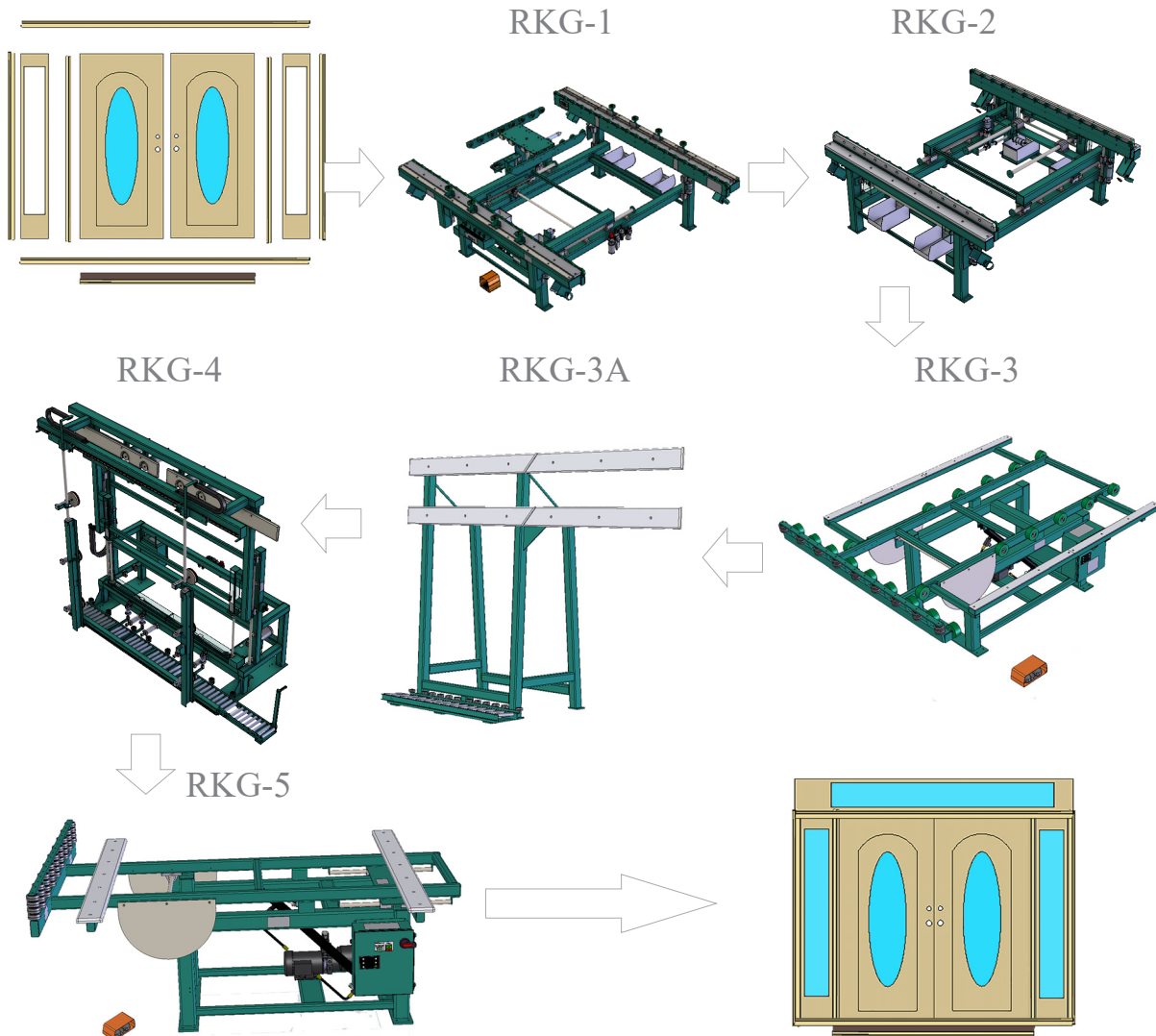


# Operation/Service Manual

Published: March 4, 2020

Innovation, Quality & Honesty

## RKG Series Door Assembly System



---

## Proprietary Notice

This Manual is confidential and contains proprietary information and intellectual property of KVAL Inc., and is to be used solely by Customer as an operating manual for KVAL Inc. machines. Neither this Manual nor any of the information contained herein may be reproduced or disclosed under any circumstances without the express written permission of KVAL Inc. For authorization to copy this information, please call Kval Customer Support at (800) 553-5825 or fax (707) 762-0485. Outside the U.S. and Canada, call (707) 762-7367.

Manual Part Number: DOC\_RKGSeries\_OPS\_V2

The RKG Series is a trademark of Kval Incorporated.

Copyright 2020 Kval Incorporated. All rights reserved.

All other products are trademarks or registered trademarks of their respective holders, all rights reserved. Reference to these products is not intended to imply affiliation with or sponsorship of Kval Incorporated.

## Contacting KVAL

**Customer Service:** For further information about this manual or other Kval Incorporated products, contact the Customer Support Department

- Mailing address:

Customer Support Department  
Kval Incorporated  
825 Petaluma Boulevard South  
Petaluma, CA 94952

- Phone and Fax:

In the U.S and Canada, call (800) 553-5825 or fax (707) 762-0485  
Outside the U.S. and Canada, call (707) 762-7367 or fax (707) 762-0485

- Business hours:

Technical Support:

6:00 AM to 4:00 PM Pacific Standard Time, Monday through Thursday

6:30 AM to 1:30 PM Pacific Standard Time, Friday

Parts & Service Sales:

6:30 AM to 4:00 PM Pacific Standard Time, Monday through Thursday

6:30 AM to 1:30 PM Pacific Standard Time, Friday

(Other sales related inquiries: <http://www.kvalinc.com>)

- Email: [service@kvalinc.com](mailto:service@kvalinc.com)

**Your Feedback is Welcome:** To help us design products that make your job easier and your business more successful, we'd like to gain your perspective about your user experience with our product - that is, the manual, the machinery, the software, etc. What was easy or difficult to use or to learn? If you could change something about the design, what would it be? Please email your comments and suggestions for improvement to [userexperience@kvalinc.com](mailto:userexperience@kvalinc.com). (**NOTE:** This is not a customer support email link. For that, please refer to the Customer Service contact information above.) Thank you!

<http://www.kvalinc.com>





---

# Table of Contents

## Chapter 1 Introduction to the RKG Series

About the RKG Series .....	1-2
Available Options.....	1-2
KVAL RKG-2.....	1-3
Available Options.....	1-3
KVAL RKG-3.....	1-4
Available Options.....	1-4
KVAL RKG-3A .....	1-4
KVAL RKG-4.....	1-5
Available Options.....	1-5
KVAL RKG-5.....	1-6
Available Options.....	1-6
About this Manual .....	1-7
Safety First!.....	1-8
Safety Sheet Sign-Off Sheet.....	1-8
Safety Terminology of Labels.....	1-8
Safety Guidelines.....	1-8
Lockout-Tagout Guidelines .....	1-12
Follow the P-R-O-P-E-R lockout rule of thumb.....	1-12
Lockout Tagout Procedure .....	1-13
Pre-Steps Before Lockout Tagout.....	1-13
Lockout Tagout Power .....	1-13
Lockout Tagout Air Supply .....	1-14
Start Maintenance.....	1-14
Post Maintenance Steps.....	1-14
Zero-Energy to Start-Up .....	1-15
Getting Help from KVAL.....	1-17
On-Line Help.....	1-17
Product Return Procedure .....	1-17
Safety Sign-Off Sheet .....	1-20
A Note to the Operator.....	1-20

## Chapter 2 Operation of the RKG-Series

RKG Line Process Summary.....	2-2
Operator's Tour .....	2-3
Foot Pedal and Control Box.....	2-3



The RKG-Series has a Main Electrical Panel .....	2-3
Description of the Six Light Panel .....	2-4
About Limit Switches .....	2-5
Switch Locations.....	2-5
Powering Operations .....	2-6
How to Power Up the Machine .....	2-6
How to Power Down the Machine.....	2-7
RKG-1 Entry Door Assembly Station .....	2-8
Typical Door Assembly Process .....	2-8
Tour of Machine .....	2-9
Sill Rail Example.....	2-9
Operation of the RKG-1 .....	2-10
RKG-2 Door Brick Mold Station .....	2-12
Tour of Machine .....	2-12
Operation of the RKG-2 .....	2-13
RKG-3 Entry Door Upright Conveyor.....	2-14
Tour of Machine .....	2-14
Operation of the RKG-3 .....	2-15
RKG-3A Entry Door Upright Conveyor .....	2-16
RKG-4 Entry Door Upright Clamp Conveyor .....	2-17
Tour of Machine .....	2-17
Operation .....	2-18
RKG-5 Tilt and Package Station .....	2-19
Tour of Machine .....	2-19
Operation .....	2-20

## Chapter 3 Maintenance of the RKG Series

Maintenance Schedule .....	3-2
Daily, Monthly, Six Month Maintenance .....	3-2
Lubrication Schedule .....	3-3
Typical Lucubration Kit.....	3-3
Lubrication Requirements.....	3-4
Pillow Block Bearing Housings .....	3-4
Flange Bearing Housings .....	3-5
Ball Rail Bearing .....	3-5
About Taper Bearings .....	3-6
Tapered Bearing Housings .....	3-6
Ball Screw Nut .....	3-7

Ball Screw Drive Assembly .....	3-7
Pulley and Idler Shafts.....	3-8
Description of Air Input System.....	3-9
Air Input with Lubrication .....	3-9
Air Line Without Lubricator .....	3-10
.....	3-10

## Chapter 4    **Troubleshooting the RKG Series**

About a Typical Contactor Control .....	4-2
About Contactor Troubleshooting .....	4-3
Limit Switches.....	4-4
Troubleshooting Electrical Problems .....	4-5
If the Power Stops During Normal Operation .....	4-5
Troubleshooting with the Status Light Panel .....	4-7







---

## CHAPTER 1 Introduction to the RKG Series

This chapter provides an overview of the KVAL RKG-Series Door Hanging System and important safety information to follow when operating the machine.

---

### Chapter 1 at a Glance

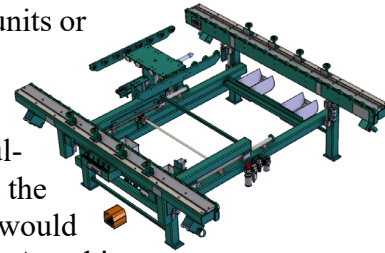
TABLE 1- 1.

Section Name	Summary	Page
<b>Safety!</b>	IMPORTANT safety information is described in this section	<a href="#">Page 1-8</a>
<b>Zero-Energy to Start-Up</b>	Procedure to power up your machine for the first time.	<a href="#">Page 1-15</a>
<b>Getting Help from KVAL</b>	This section describes the method to contact the KVAL service center for help. The section includes how to get information from the specification plate to provide to KVAL, service center hours, and return procedures	<a href="#">Page 1-17</a>
<b>Safety Sign-Off Sheet</b>	A record to track operators that are trained on the machine.	<a href="#">Page 1-20</a>

## About the RKG Series

The **KVAL RKG-1 Entry Door Assembly Station** makes it possible to assemble steel, fiberglass, or wood door units with sidelights, patio door units or double door units.

The design of this **RKG-1**, eliminates the manual lifting and turning of the doors during the assembly of a door unit with multiple parts. This station is designed to receive a door panel with the hinge jamb or mull post attached, exterior side up. This station would typically be used immediately after an Acrobat or a Hinge Jamb Attaching Station.



For a double door unit, the left-hand door panel would be prepared and rolled into the machine. The door panel, with the jamb attached, would then be rotated 90 degrees counter clockwise and lowered onto non-marking polyurethane wheels. These wheels are positioned to support the door on the top and bottom rail. They provide clearance for door light frames or raised molding. The second door, with the jamb attached is then rolled into the station, rotated, and positioned next to the first door. The pair of doors is then lowered onto jamb support plates.

The operators, one working at the top of the door unit and one working at the sill end, simultaneously install the head jamb and sill. A clamping system holds the components in place so they can accurately fasten the head and sill to the side jambs. After the frame has been assembled, the door unit is raised with the polyurethane rolls so that it can be safely rolled to the next station.

The standard machine will accommodate doors 6'-8" high and doors that vary in width from 2'6" to 3'0". With the 8'0" door capacity option, the **RKG-1** can be set up to accommodate doors that vary in height from 6'8" to 8'0". The **RKG-1** will accommodate all jamb widths.

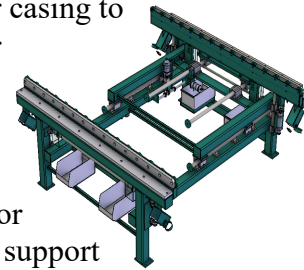
### Available Options

For detailed information about available options, please contact our KVAL Sales and Service department.

Option	Title	Description
<b>Option A:</b>	6' 8", 7'0", 8'0" Door Capacity	Allows door units up to 6' 8", 7'0", 8'0" to be assembled and transferred.
<b>Option B:</b>	9'0" Door Width Option	Allows door units up to 9'0" to be assembled and transferred.
<b>Option C:</b>	Out-swing Door Option	The sill end of the RKG-1 will be modified to accommodate an out-swing sill, with a projection of 1-1/4" maximum from the outside of the jamb.
<b>Option</b>	Tooling and Lubricant	Please review with your KVAL consultant to determine your needs.

## KVAL RKG-2

The **KVAL RKG-2 Entry Door Brick Mold Station** is for applying exterior casing to steel, fiberglass, or wood door units with side lights, patio door units or double doors.



This station is designed to receive an assembled door unit from the **RKG-1 Entry Door Assembly Station** on non-marking polyurethane wheels that supports the doors on the top and bottom rails. After the door unit is in the station, the unit is lowered approximately 5” and set onto support plates so it will not move. The lowered height makes it easier and safer for the operator to apply the outside casing and any required packaging. This would include a skid board to protect the sill from damage.

After the outside casing and packaging have been applied, the door unit is raised up on the polyurethane wheels so that it can safely be rolled to the next station.

The standard **RKG-2** will accommodate doors 6’8” high and doors that vary in width from 2’6” to 3’0”. With the 8’0” door capacity option, the Entrada-2 can be set up to accommodate doors that vary in height from 6’8” to 8’0”. This station will accommodate all jamb widths.

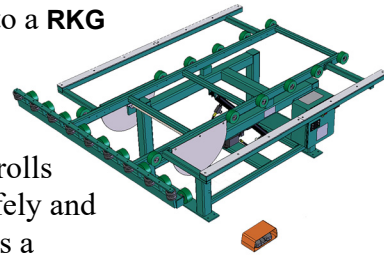
### Available Options

For detailed information about available options, please contact our KVAL Sales and Service department.

Option	Title	Description
<b>Option A:</b>	6’ 8”, 7’0”, 8’0" Door Capacity	Allows door units up to 6’ 8”, 7’0”, 8’0" to be assembled and transferred.
<b>Option B:</b>	Transom Support	Accommodate up to 12" height; for 6’8" doors only Note: When this option is selected, the 8’0” option for the RKG-4 Upright Conveyor must be specified.
<b>Option C:</b>	9’0" Door Width Option	Allows door units up to 9’0" to be assembled and transferred.
<b>Option</b>	Tooling and Lubricant	Please review with your KVAL consultant to determine your needs.

## KVAL RKG-3

The **KVAL RKG-3 Entry Door Tilt Up Station** is designed to raise assembled entry door units from a horizontal to a vertical position, for feeding into a **RKG 4, RKG 3-A Upright Clamp Conveyor**. This station is designed with non-marking polyurethane wheels to support the door on the top and bottom rails. The wheels are positioned so door light frames and raised moldings will not be damaged. There are also rolls on the sill support plate. These wheels enable one operator to safely and easily move the door unit to the next station. The tilt table utilizes a hydraulic tilt cylinder, electric pump, and foot switch for control.



A three-phase electric supply, in addition to the air supply, must be provided for the **RKG-3**.

The standard machine will accommodate doors that are 6'8" high only, and doors that vary in width from 2'6" to 3'0". With the optional 8'0" door capacity option, the machine can be set up to accommodate doors that vary in height from 6'8" to 8'0". The **RKG-3** will accommodate jamb widths up to 6-9/16".

### Available Options

For detailed information about available options, please contact our KVAL Sales and Service department.

Option	Title	Description
<b>Option A:</b>	8'0" Door Capacity	Allows door units up to 8'0" to be assembled and transferred.
<b>Option B:</b>	9'0" Door Width Option	Allows door units up to 9'0" to be assembled and transferred.
<b>Option C:</b>	Frame Extension	Allows for a 98"-wide door frame with double sidelights.
<b>Option</b>	Tooling and Lubricant	Please review with your KVAL consultant to determine your needs.

## KVAL RKG-3A

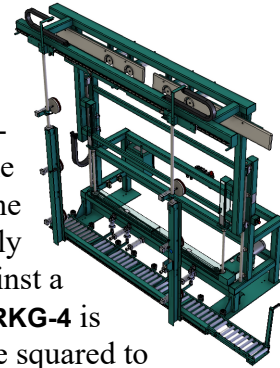
The **KVAL RKG-3A Entry Door Upright Conveyor** is used to receive the door unit after it has been raised to a vertical position by the RKG-3 and to align the door unit with the **RKG-4** or **RKG-5 Entry Door Upright Clamp/Conveyor**. The **RKG-3A** may be used as a work station to install caulking in the sidelight frames and to set the sidelight panels into the frames. The **RKG-3A** will accommodate entry door units from 6'-8" high to 8'-0" high.



## KVAL RKG-4

The **KVAL RKG-4 Entry Door Upright Conveyor** makes easy work of installing sidelight panels in steel, fiberglass, or wood door units with sidelights, or patio door units.

**RKG-4** is designed to receive assembled door units in a vertical orientation from the **RKG-3 Tilt-Up Machine** or **RKG-A Entry Door Conveyor**. The door unit is tilted all the way up and over to 6 degrees past vertical so the unit is leaning on the exterior side. In this position the door unit is easily rolled to the clamp station. At this station the door unit is clamped against a fence that holds the door unit vertical so the door can be opened. The **RKG-4** is also equipped with a momentary sill clamp release, so the frame can be squared to the door before the sidelight panels are secured. This ensures that the frame will be square after the sidelights are installed.



The **RKG-4** is also equipped with a special clamping system that will press the sidelight panels into the sealing compound. The clamps are air-actuated and are controlled by a single push/pull valve, enabling one operator to easily and safely install each sidelight panel. After the panels are seated, the operator can open the door to secure the sidelight panels through the mull posts. After the sidelight panels have been installed, the door unit is unclamped so it is leaning against the brick mold. In this position the door unit can easily be rolled to the next station.

The standard machine will accommodate doors 6'8" high and doors that vary in width from 2'6" to 3'0".

With the 8'0" door capacity option, the machine can be set up to accommodate doors that vary in height from 6'6" to 8'0". To change the machine to accommodate different height doors, the entire upper guide assembly and clamps are raised or lowered by turning screws at four locations. For 8'0" high door units the operator will need a movable platform of some type to reach the tops of the door units. The platform unit is not included. The **RKG-4** will accommodate jambs up to 6-9/16" wide.

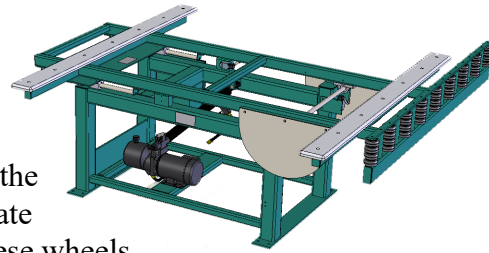
### Available Options

For detailed information about available options, please contact our KVAL Sales and Service department.

Option	Title	Description
<b>Option A:</b>	8'0" Door Capacity	Allows door units up to 8'0" to be assembled and transferred.
<b>Option E:</b>	2nd Sidelight Clamp Assembly	A second adjustable side light clamp assembly will be installed on the RKG-4. The second clamp assembly may be used to simultaneously clamp two side lights on either side of a single door unit up to 3'-0" wide. The second clamp may also be used with the primary clamp to install 3'-0" wide side light panels by pressing on both edges of the panel to properly seat it into the frame.
<b>Option</b>	Tooling and Lubricant	Please review with your KVAL consultant to determine your needs.

## KVAL RKG-5

The **KVAL RKG-5 Tilt & Package Station** is designed to receive entry door units in a vertical orientation from the **RKG-4** or **RKG-3A**, and gently lower them to a horizontal position.



The **RKG-5** is designed with non-marking slide plates on the top and bottom for the brick mold to slide on. The sill plate on the machine is equipped with ball bearing wheels. These wheels support the weight of the door unit so one operator can safely move the door unit onto this station. After the door unit is on the machine, the operator can easily tilt it to a horizontal position with the aid of a hydraulic cylinder.

In this position the operator can apply the inside stops to the sidelight panels and any necessary packaging to the inside of the door unit. The completed door unit can then be tilted back to vertical so it can be rolled off this station.

A three-phase electric supply, in addition to the air supply, must be provided for the **RKG-5**.

The standard **RKG-5** will accommodate doors 6'8" high and doors that vary in width from 2'6" to 3'0".

With the 8'0" door capacity option, this station can be set up to accommodate doors that vary in height from 6'8" to 8'0". The **RKG-5** will accommodate all jamb widths.

### Available Options

For detailed information about available options, please contact our KVAL Sales and Service department.

Option	Title	Description
<b>Option A</b>	8'-0" Door Height Capacity	Allows door units up to 8'0" to be assembled and transferred.
<b>Option B</b>	Lifting Mechanism	To raise sill up to a maximum of 9-3/4" above floor when door unit is in the vertical position. For door units up to 6'0" wide. For door widths over 6'0" wide, please call for quote.
<b>Option C</b>	9'0" Door Width	Allows door units up to 9'0" width to be assembled and transferred.
<b>Option D</b>	Transom Access & Mounting Feature	Provides frame extensions to support transoms and attach them by practiced methods, then tilt up the assembled unit to a near vertical position. Size limitations apply for transoms; maximum width for nominal 6' entry and maximum height for 3' tall round or rectangular transom on a 6'8" door.
<b>Option</b>	Spare Parts Package	Please review with your KVAL consultant to determine your needs.
<b>Option</b>	Tooling and Lubricant	Please review with your KVAL consultant to determine your needs.



## About this Manual

---

This manual contains operation information and service and maintenance information.

It includes identification of machine assemblies, power-up and power-down steps, and information about using the user interface. The Troubleshooting and Maintenance sections are directed toward qualified service technicians

---

## Safety First!



This machine is a powerful electro-mechanical motion control system. You should test your motion system for safety under all potential conditions. **Failure to do so can result in damage to equipment and/or serious injury to personnel.**

### Safety Sheet Sign-Off Sheet

At the end of this chapter, there is a safety sign-off sheet. It lists personnel and machine safety criteria to understand before operating the machine. It is highly recommended that personnel operating, working on a machine meet the criteria listed in this sheet. It is recommended the sheet be signed and kept for records. See “Safety Sign-Off Sheet” on page 1-20.

### Safety Terminology of Labels

In addition to the nameplate, KVAL machines may have other warning labels or decals that provide safety information to operators. Safety labels should be clearly visible to the operator and must be replaced if missing, damaged, or illegible.

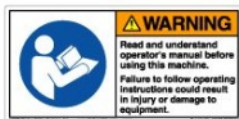
There are three types of warning labels or decals:

- **DANGER** means if the danger is not avoided, it will cause death or serious injury.
- **WARNING** means if the warning is not heeded, it can cause death or serious injury.
- **CAUTION** means if the precaution is not taken, it may cause minor or moderate injury.

### Safety Guidelines

In addition to the caution and warning labels affixed to this machine, follow the guidelines below to help ensure the safety of equipment and personnel.

#### Training



Ensure that all employees who operate this machine are aware of and adhere to all safety precautions posted on the machine and are trained to operate this machine in a safe manner.



## Protective Gear



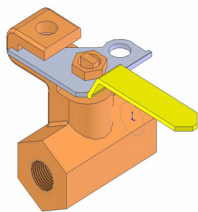
**Never** operate the machine without proper eye and ear protection.

## When the Machine is ON



- **Never** reach hands beyond safety cage. Servo motors can unexpectedly move quickly.
- **Never** clear screws or hinges out of the machine while it is running.
- **Never** reach into the router area to retrieve a hinge. The router may still be running down after shut down.
- **Never** perform any maintenance unless machine is at zero state.
- **Never** clean the machine while it is running.
- **Never** walk away from the machine while it is running.

## Compressed Air



The compressed air system connected to this machine should have a three-way air valve for shut-off and pressure relief.

All cylinders on machine are under high pressure and can be very dangerous when activated. Before performing any maintenance or repairs on this machine turn off the main air disconnect. **Lockout and tagout this connection.**

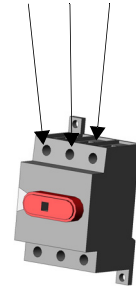
See “Lockout Tagout Procedure” on page 1-13.

## Electrical



Electrical circuitry on this machine is protected by an approved lockable disconnect circuit. In addition to this equipment, you must install an approved disconnect for the electrical power supplying this machine.

Still has power in OFF position



When opening the cabinet you must first turn off the disconnect switch. When the cabinet door is open there is **still power on the top side of the disconnect switch**. Some machines are powered by more than one supply located at different locations. Before performing any repairs or maintenance, lockout and tagout **must be installed at all locations**

All maintenance and repairs to electrical circuitry should only be performed by a qualified electrician.

## Before Conducting Maintenance



Prior to performing any maintenance, repairs, cleaning or when clearing jammed debris, you must disconnect, tag out, or lock out the electrical and air pressure systems. This should be done in accordance with applicable state and/or federal code requirements.

## Laser Warnings

On some machines, laser indicators are used to set boundaries. Follow the manufacturers safety precautions.



### Class 2

Lasers that emit visible radiation in the wavelength range from 400 nm to 700 nm where eye protection is normally afforded by aversion responses, including the blink reflex. This reaction may be expected to provide adequate protection under reasonably foreseeable conditions of operation, including the use of optical instruments for intrabeam viewing.

Reference 60825-1 Amend. 2 © IEC:2001(E), section 8.2.

## Compliance with Codes and Regulations



KVAL advises that you request an on-site state safety review of your installation of this machine. This is to ensure conformance to any additional specific safety and health regulations which apply in your geographic area.

## Other Hazard Control Action

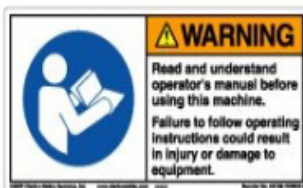
### Report a Hazard Before You Report an Accident



If you believe any part or operation of this machine is in violation of any health or safety regulation, **STOP** production. It is your responsibility to immediately protect your employees against any such hazard.

Additional detailed safety guidelines are included in the operating instructions of this manual. KVAL will be pleased to review with you any questions you may have regarding the safe operation of this machine

## Follow Your Company's Safety Procedures



In addition to these safety guidelines. Your company should have on-site and machine specific safety procedures to follow.

## Lockout-Tagout Guidelines

- Place a tag on all padlocks. On the tag, each operator must put their own name and date. **(These locks are only to be removed by the person who signs the tag)**
- If more than one person is working on the machine, each additional person places a lock and tag on each disconnect.
- Only each operator may remove their own lock and tag.

**Important:** When many people are all working on the same machine you will need a multiple lockout device, such as the one shown here.



Follow the **P-R-O-P-E-R** lockout rule of thumb.

- P.....** Process shutdown
- R .....** Recognize energy type (electrical, pneumatic, mechanical, etc.)
- O.....** OFF! Shut off all power sources and isolating devices
- P.....** Place lock and tag
- E.....** ENERGY: Release stored energy to a zero-energy state
- R .....** Recheck controls and test to ensure they are in the “OFF” state

## Lockout Tagout Procedure



This policy is required by OSHA regulation 1910.147 and Cal OSHA'S SB198 ruling of July 1991.

Use the following lockout procedure to secure this machine while it is powered down. During a lockout, you disconnect all power and shut off the air supply. Be sure to use the tagout guidelines noted below.

### Pre-Steps Before Lockout Tagout

Inspect



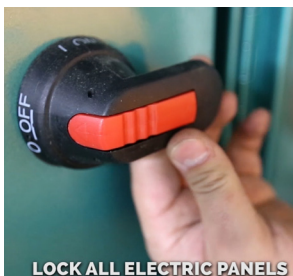
1. Evaluate the equipment to fully understand all energy sources (multiple electrical supplies, air supply and pressure, spring tension, weight shifts, etc.).
2. Inform all affected personnel of the eminent shutdown, and the duration of the shutdown.
3. Obtain locks, keys, and tags from your employer's lockout center.

### Lockout Tagout Power

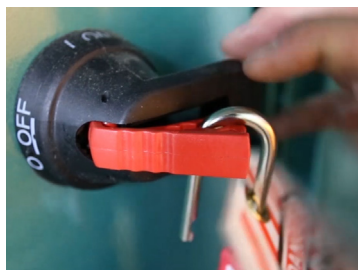
Power



4. Turn off machine. See Chapter 2 for power down and power up procedures.
5. Turn the disconnect switches on **ALL** electrical and frequency panels to the OFF position. Then push the red tab to pop it out. Place a padlock through the hole. Place your tag on the padlock, as per the tagout guidelines below. (see illustration below).



Turn Switch to the OFF position



Insert Lock into hole.



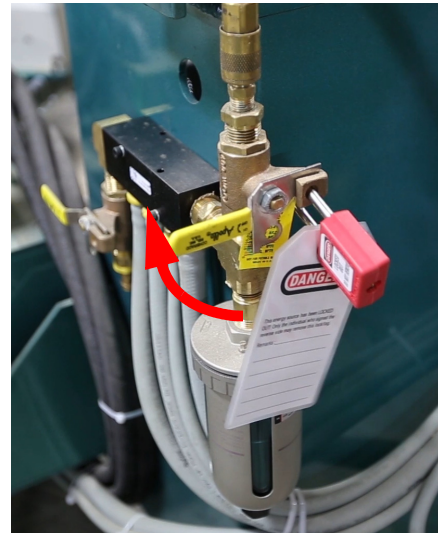
Lock and Tag out

**Note:** When multiple people are working on the machine, each person needs to have a lock on the handle in the extra holes provided.

## Lockout Tagout Air Supply



6. Turn all air valves to the OFF position and place a padlock through the hole (see illustration below).  
**NOTE:** Place your tag on the padlock, as per the tagout guidelines.



### Start Maintenance

7. Once the locks and tags are in place and all personnel are clear, attempt to operate the machine to ensure equipment will not operate.
8. Maintenance or repairs may started.

### Post Maintenance Steps

9. After maintenance is completed, the person performing the work must ensure all tools, spare parts, test equipment, etc., are completely removed and that all guards and safety devices are installed.
10. Before removing the locks and tags, the person who attached them shall inspect the equipment to ensure that the machine will not be put in an unsafe condition when re-energized.
11. The lock and tag can now be removed (only by the person(s) who placed them), and the machine can be re-energized.
12. The tags must be destroyed and the locks and keys returned to the lockout center.



---

## Zero-Energy to Start-Up

Starting the equipment properly is just as important as the lockout/tagout guidelines in terms of safety.

### **Start-up Guidelines**

The following guidelines below should be followed to start the equipment.

#### **Inspect**

The equipment must be inspected for proper adjustment before starting equipment.

#### **Clean Up**

All materials and debris must be cleaned up. Any combustible materials or old parts used during repairs must be cleaned up and/or properly disposed of.

#### **Replace Guards**

Replace all equipment guards. If part of equipment cannot be properly adjusted after start-up with guard on, contact the KVAL Service team. See “Getting Help from KVAL” on page 1-17.

#### **Check Controls**

Confirm that all switches are in the “OFF” position. Please be advised that some components of the machine may start automatically when energy is restored.

#### **Remove Locks**

Each operator must remove his or her own lock and tag. This will ensure that all operators are in a safe place when the equipment is started.

#### **Perform Visual Checks**

If the equipment is too large to see all around it, station personnel around the area and sound the personnel alarm before starting the equipment. If your operation is more complex, your company’s comprehensive safety procedure may involve additional steps. You will need to ask your supervisor about these procedures. The company’s lockout procedure should be posted at each machine. On larger or long-term maintenance or installation projects, the company’s procedures must be explained to all new operators and a copy of the company’s procedures should be posted on-site for the duration of the work.

The Company’s procedures should also include provisions for safely handling shift changes and changes in operators or new operators. Comprehensive lockout/tagout may use a gang box or other system to ensure that locks are secure and not removed without authorization.



Remember, lockout/tagout procedures work because you are the only one with the key to your lock. Proper lockout/tagout can save lives, limbs, and money. Help make your work environment safe for you and your fellow workers. Be sure to follow the P-R-O-P-E-R lockout/tagout procedures, and that those around you do also.

### **Close the Cage Gate**

Verify all cage gates are securely closed. Ensure all safety protocols are in effect.



## Getting Help from KVAL

Before you seek help, first try the troubleshooting procedures. Follow the procedures below.

If you are unable to resolve the problem:

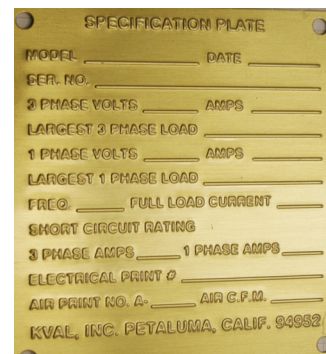
1. Locate the machine's Specification Plate and record the serial number, 3 phase volts, electrical print number, and air print number.



Air Driven Machines



Pre -2019 Machines,  
look for the brass plate.



2. Contact our customer support team:

- In the U.S and Canada, call (800) 553-5825 or fax (707) 762-0485
- Outside the U.S. and Canada, call (707) 762-7367 or fax (707) 762-0485
- Email address is [service@kvalinc.com](mailto:service@kvalinc.com)
- Hours:

6:00 AM to 4:00 PM Pacific Standard Time, Monday through Thursday

6:30 AM to 1:30 PM Pacific Standard Time, Friday



## On-Line Help

On machines with a Beckhoff<sup>®</sup> PLC and an internet connection, our service team are able to connect, run, and troubleshoot your machine.

## Product Return Procedure

If you've contacted Kval for help and it is determined that a return is necessary, use the procedure below to return the machine or part.

**Note:** Non-Warranty returns are subject to a 15% restocking charge.

1. Obtain the packing slip and/or invoice numbers of the defective unit, and secure a purchase order number to cover repair costs in the event the unit is determined to be out of warranty.
2. Reason for return: Before you return the unit, have someone from your organization with a technical understanding of the machine and its application include answers to the following questions:
  - What is the extent of the failure/reason for return? What are the relevant error messages or error codes?
  - How long did it operate?
  - Did any other items fail at the same time?
  - What was happening when the unit failed (e.g., installing the unit, cycling power, starting other equipment, etc.)?
  - How was the product configured (in detail)?
  - Which, if any, cables were modified and how?
  - With what equipment is the unit interfaced?
  - What was the application?
  - What was the system environment (temperature, spacing, contaminants, etc.)?
3. Call Kval customer support for a Return Material Authorization (RMA). When you call:
  - Have the packing slip or invoice numbers available.
  - Have the documented reason for return available.
4. Send the merchandise back to Kval.
  - Make sure the item(s) you are returning are securely packaged and well protected from shipping damage
  - Include the packing slip or invoice numbers.
  - Include the documented reason for return.
  - Include the RMA number with the parts package.



Page Intentionally Left Blank



# Safety Sign-Off Sheet

Machine Model Number: \_\_\_\_\_

## A Note to the Operator

This machine can help you be highly productive only if you understand how to use it properly and follow the safe operating practices described in this document and the machine’s manual. If you do not understand the machine’s proper operation or ignore the safe operating practices, this machine can hurt or kill you. It’s in your best interest to safely and properly operate this machine.

### Personnel Safety Concerns:

- I have been properly trained in the operation of this machine.
- I will always wear ear protection when operating this machine.
- I will always wear eye protection when operating this machine.
- I will never wear loose clothing or gloves when operating this machine.
- I will watch out for other people. Make sure everyone is clear of this machine before operation.
- I will always follow my company’s safety procedures. I have read and understand these guidelines.

### Machine Safety Concerns:

- I have been given a tour of the machine and understand all the safety labels, E-Stops and the actions to take in case of an emergency.
- I will make sure all guards are in place before operation
- I will turn off the compressed air, before loading hardware (staples, screws, etc)
- I will turn off the electrical power, for setup
- If the machine should operate in an unexpected manner stop production I will immediately and notify a manager, a supervisor, or a qualified service technician.

**I have read and understand this document and agree to operate this machine in a safe manner as described above.**

### Employee

Name (print): \_\_\_\_\_ Signature: \_\_\_\_\_ Date: \_\_\_ / \_\_\_ / \_\_\_

### Supervisor/Safety Officer/Trainer

Name (print): \_\_\_\_\_ Signature: \_\_\_\_\_ Date: \_\_\_ / \_\_\_ / \_\_\_

**Note:** It is recommended you make a copy of this sheet for new operators. If a copy is needed, you may download a PDF at the KVAL website (<http://www.kvalinc.com>). You may also contact our Service Department at (800) 553-5825 or email at [service@kvalinc.com](mailto:service@kvalinc.com).





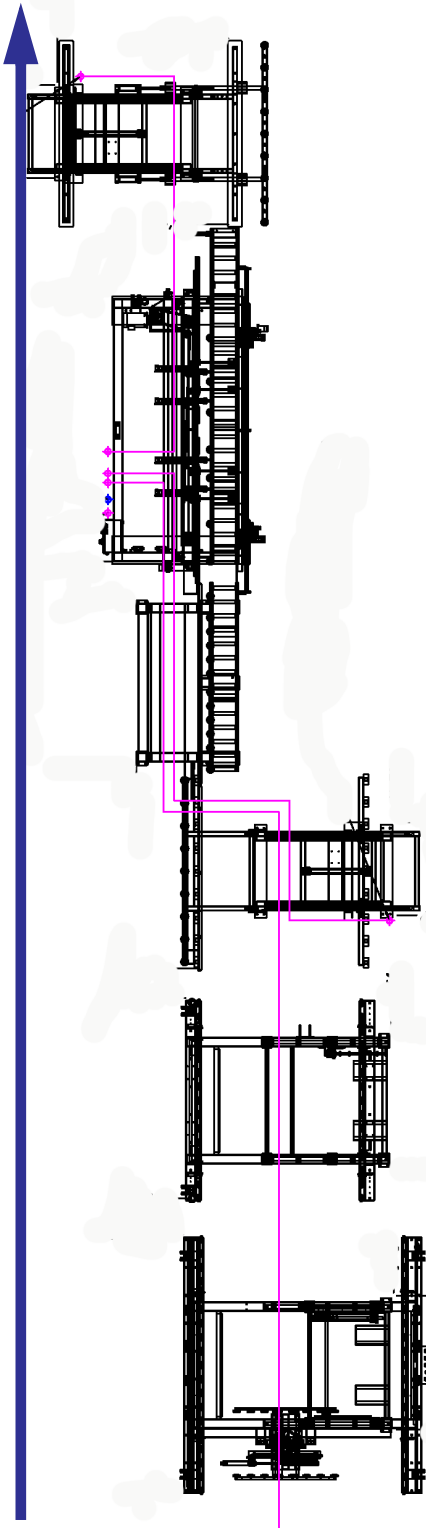
## CHAPTER 2      Operation of the RKG-Series

The content is geared to help operators understand the basic operation of the **RKG-Series**. Included are instructions to calibrate the machine and run a door.

### Chapter 2 at a Glance

<b>Section Name</b>	<b>Summary</b>	<b>Page</b>
<b>Operator's Tour</b>	Descriptions of the operation of the parts and assemblies of the machine	<a href="#">Page 2-3</a>
<b>Powering Operations</b>	Descriptions of power up, power down, homing, and emergency stops	<a href="#">Page 2-6</a>
<b>RKG-1 Entry Door Assembly Station</b>	Description of the machine	<a href="#">Page 2-8</a>
<b>RKG-2 Door Brick Mold Station</b>	Description of the machine	<a href="#">Page 2-12</a>
<b>RKG-3 Entry Door Upright Conveyor</b>	Description of the machine	<a href="#">Page 2-14</a>
<b>RKG-3A Entry Door Upright Conveyor</b>	Description of the machine	<a href="#">Page 2-16</a>
<b>RKG-4 Entry Door Upright Clamp Conveyor</b>	Description of the machine	<a href="#">Page 2-17</a>
<b>RKG-5 Tilt and Package Station</b>	Description of the machine	<a href="#">Page 2-19</a>

## RKG Line Process Summary



**RKG-5:** The *RKG-5 Tilt & Package Station* is designed to receive entry door units in a vertical orientation from the RKG-4 or RKG-3A, and gently lower them to a horizontal position.

**RKG-5** After the door unit is on the machine, the operator can easily tilt it to a horizontal position with the aid of a hydraulic cylinder and inspect or package the door. See “[RKG-5 Tilt and Package Station](#)” on page 2-19.

**RKG-4:** The *RKG-4 Upright Conveyor* is designed to install sidelight panels in steel, fiberglass, or wood doors with sidelights, or patio doors. The RKG-4 is designed to receive assembled doors in a vertical orientation from the RKG-3 Tilt-Up Machine.

**RKG-4** The RKG-4 is also equipped with a special clamping system that will press the sidelight panels into the sealing compound. After the panels are seated, the operator can open the door to secure the sidelight panels through the mull posts. See “[RKG-4 Entry Door Upright Clamp Conveyor](#)” on page 2-17.

**RKG-3A:** The RKG-3A Upright Conveyor is used to receive a door after it has been raised to a vertical position by the RKG-3 and align the door with the RKG-4 Upright Conveyor. The RKG-3A may be used as a work station to install caulking in the sidelight frames and to set the sidelight panels into the frames. See “[RKG-3A Entry Door Upright Conveyor](#)” on page 2-16.

**RKG-3:** The RKG-3 Tilt Up Station is designed to raise assembled entry door from a horizontal to a vertical position for feeding into the RKG-4 Upright Clamp Conveyor. See “[RKG-3 Entry Door Upright Conveyor](#)” on page 2-14.

**RKG-2:** The *RKG-2 Brick Mold Station* is for applying exterior casing to steel, fiberglass, or wood door with side lights, patio door or double doors. It is designed to receive an assembled door from the RKG-1. See “[RKG-2 Door Brick Mold Station](#)” on page 2-12.

**RKG-1:** The *RKG-1 Assembly Station* assembles steel, fiberglass, or wood doors. It receives a door panel with the hinge jamb or mull post attached, exterior side up.

**RKG-1** For double doors the left-hand door panel is prepared and rolled into the machine. The panel, with the jamb attached, is then rotated 90 degrees counter clockwise and lowered onto non-marking polyurethane wheels.

Two operators, simultaneously install the head jamb and sill. See “[RKG-1 Entry Door Assembly Station](#)” on page 2-8.

## Operator's Tour

This section describes controls and Assemblies on the **RKG-Series** machines.

### Foot Pedal and Control Box

Use the **Foot Pedal** to move the tables up or down. Press the desired foot switch to move the table to the desired position.



### The RKG-Series has a Main Electrical Panel

Figure 2- 1 below, is an overview of the location of assemblies in the panel

**Warning:** High Voltage is present in this panel at the top of the Three Phase Input **even with the disconnect off**. If working on the panel, follow safety protocol as described in Chapter 1.

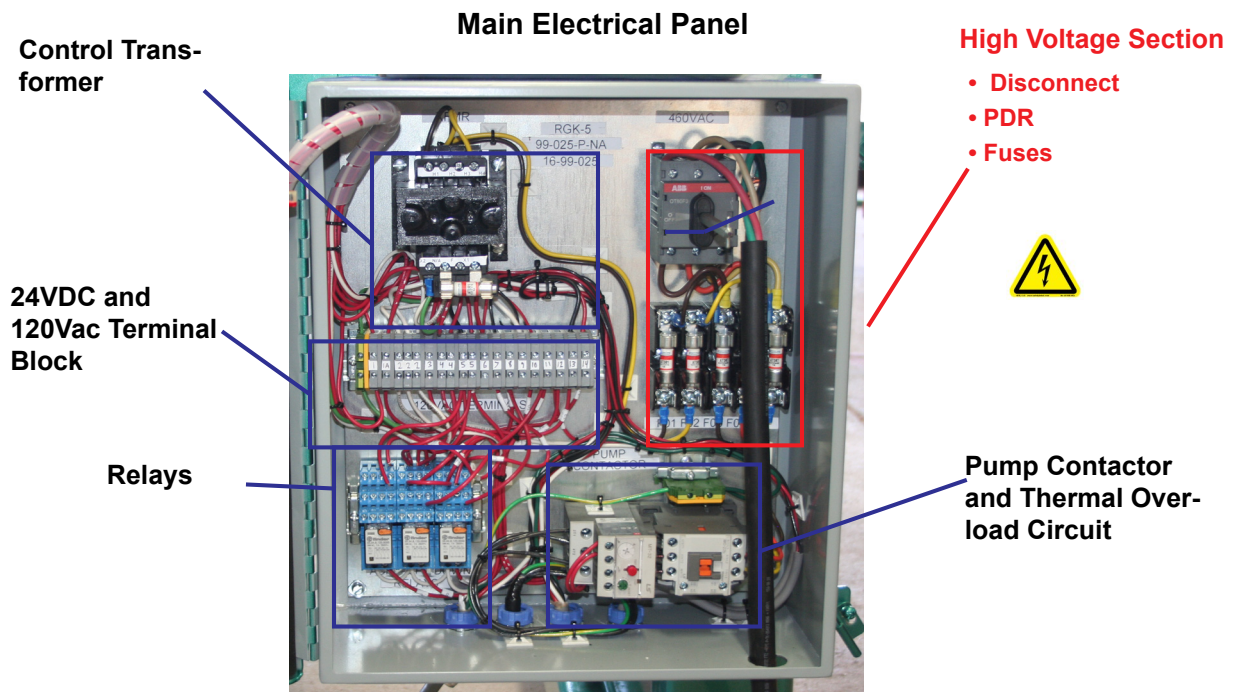


FIGURE2- 1. Overview of Main Electrical Panel and High Frequency Panel



## Description of the Six Light Panel

The six lights on this panel indicate the status of the **RKG-Series** system.

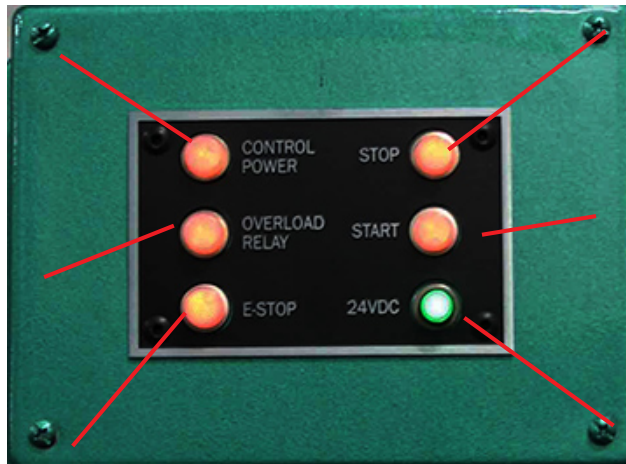
The Sequence that the lights activate is as follows:

1. Control Power
2. Overload Relay
3. E-Stop
4. Stop
5. Start
6. 24VDC

**Control Power** – light illuminates when the Control Transformer is pulled out and the power is working on secondary side-of transformer

**Overload Relay** – The overload circuit is working when light is on

**E-Stop** – The back gate is closed and Frame E-stop is not activated when this light is on.



**Stop** – This light will be on if Machine Stop button is deactivated.

**Start** – This light will be on once the Machine Start button is pressed and the ACR Relay is latched.

**24VDC** – light comes on once the ACR is latch and the 24VDC power Supply is working

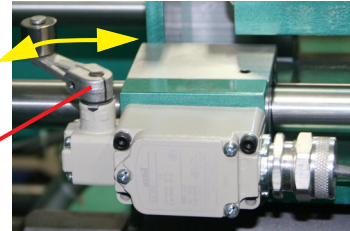
## About Limit Switches

Limit switches are mechanically tripped to identify the maximum and minimum limit of the lift.

The **Limit Switch** is activated by an assembly moving a switch arm.

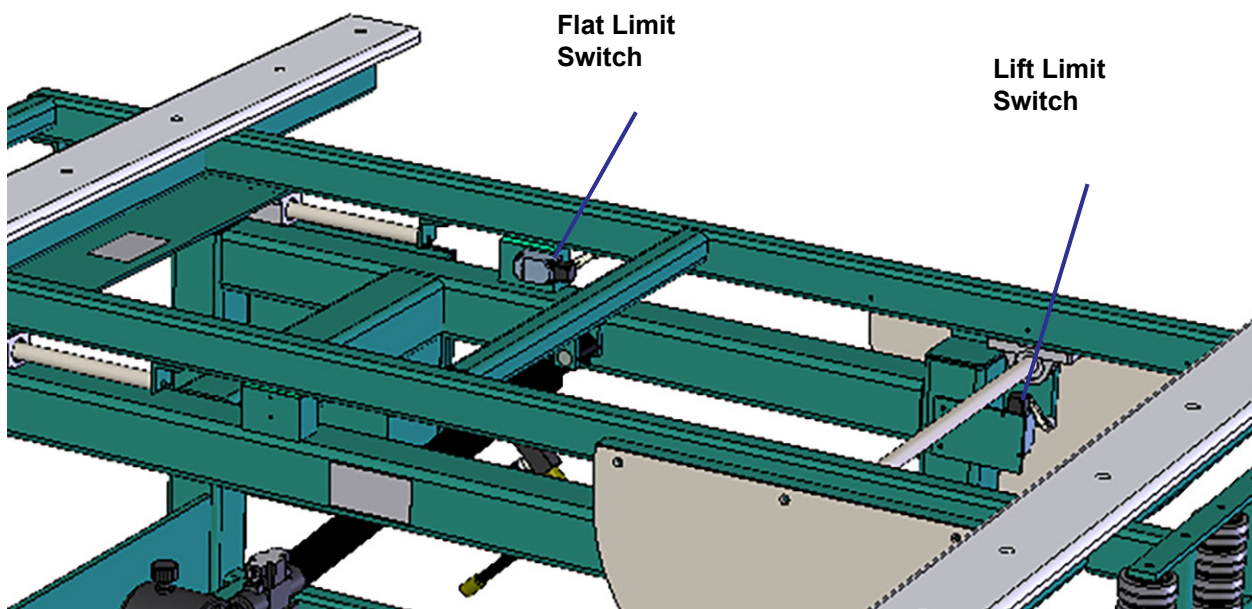
- Depending on the model of limit switch, the amount of “pre-travel” (amount of movement from the arms resting position) is either 5 or 20 degrees before the limit switch actuates (Clicks).

Switch Arm



## Switch Locations

The tilt machines have Limit Switches for the Flat Location and Tilt locations. Below is an example of switch locations on the **RKG-5**.



## Powering Operations

This section describes how to power up and to power down the machine.

Powering up the system includes:

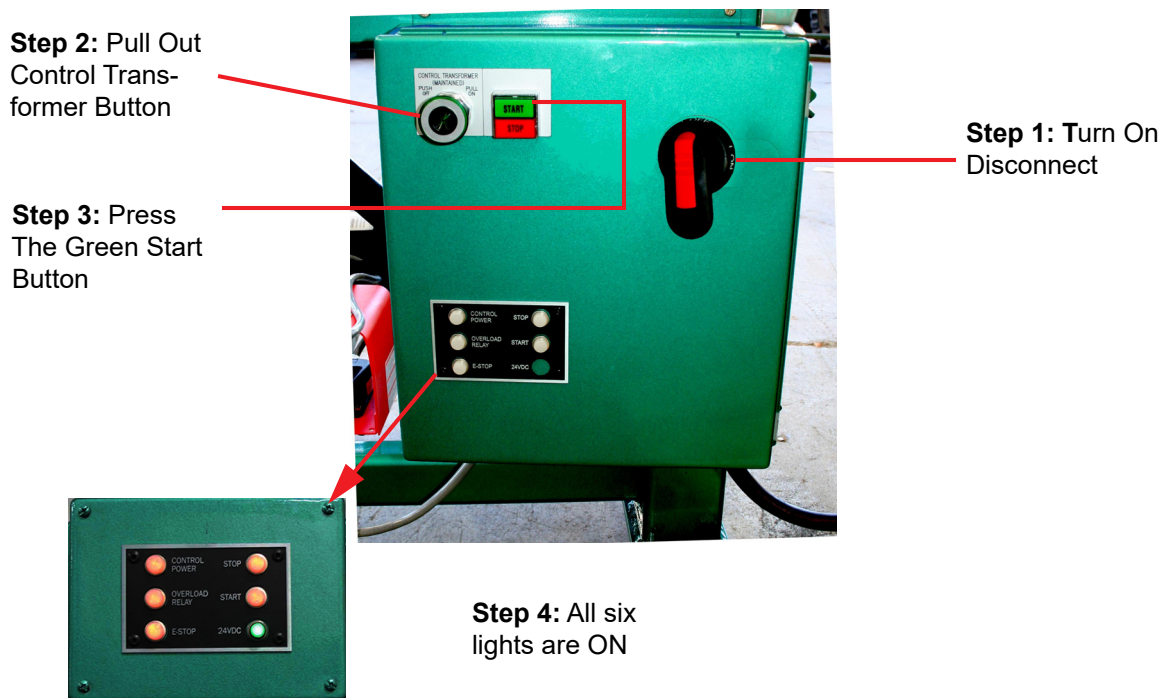
- Applying power to the entire system
- Starting the Control Circuit

Powering down the system includes:

- Shutting down the control power
- Removing power from the entire system

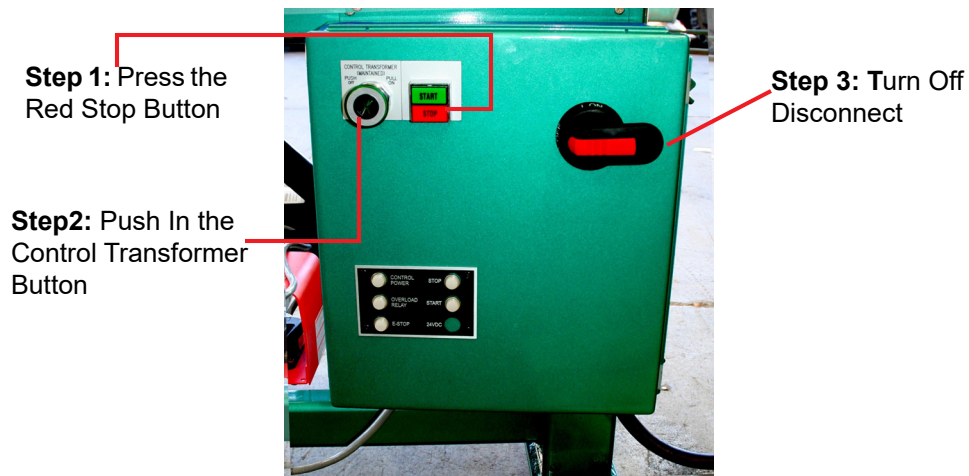
### How to Power Up the Machine

1. Ensure factory air is applied to machine and main air supply is turned on.
2. Make sure the electrical disconnect the electrical cabinet is turned to the ON position.
3. Pull the green **CONTROL TRANSFORMER Button** out to the ON position. It should light up.
4. Push the green **START MACHINE Button** to initialize the machine.
5. The Six Lights will turn-on.



## How to Power Down the Machine

1. Push the **Stop** button, located on the Electrical Panel.
2. Push the green **CONTROL TRANSFORMER Switch** to the OFF position.
3. KVAL also recommends that you turn the disconnect switch on the electrical cabinet to OFF; this helps reduce possible damage resulting from power surges from electrical storms.



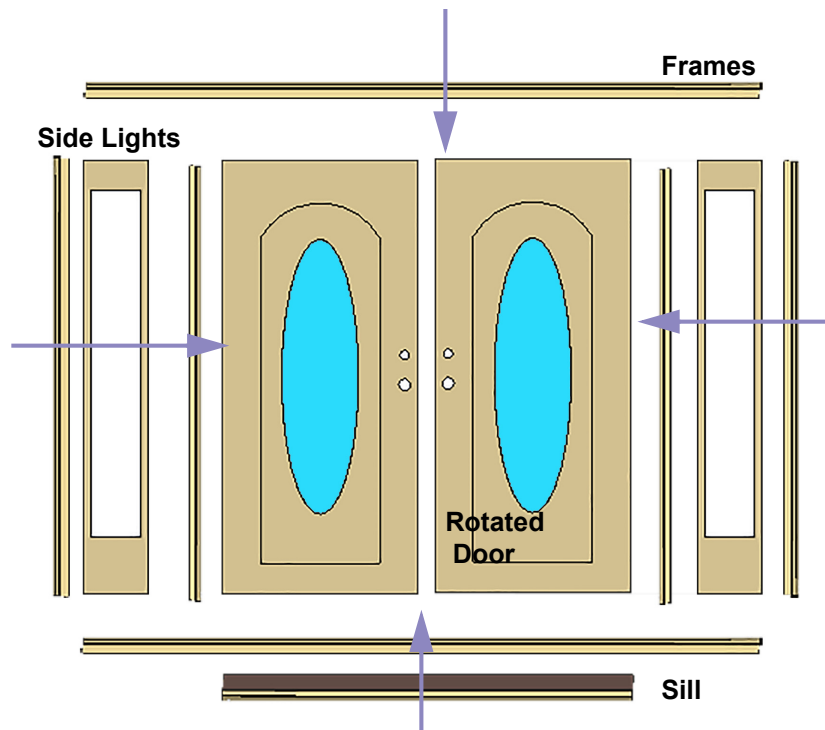
## RKG-1 Entry Door Assembly Station

The **KVAL RKG-1 Entry Door Assembly Station** is the first machine to receive doors. This station is designed to receive a door panel with the hinge jamb or mull post attached, exterior side up. This station would typically be used immediately after an Acrobat or a Hinge Jamb Attaching Station.

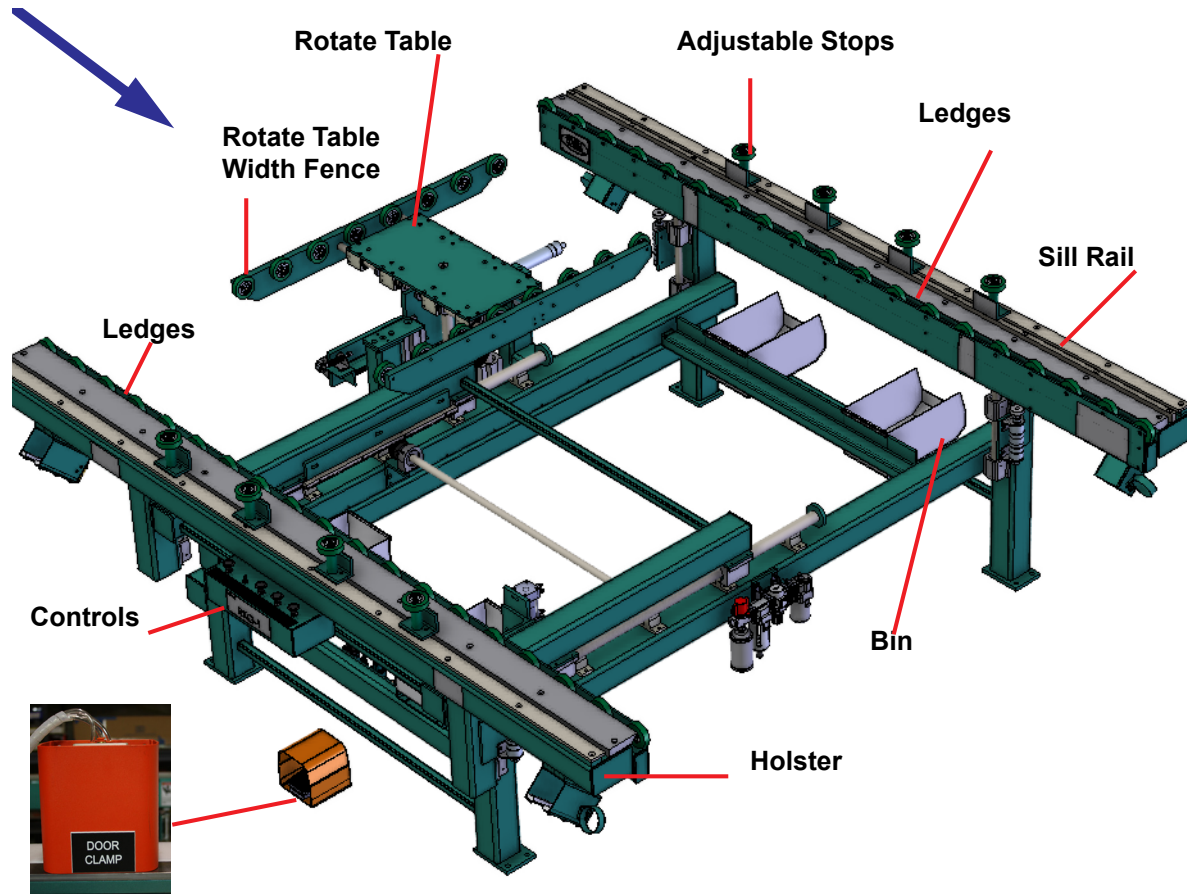
### Typical Door Assembly Process

#### At this Station:

- Align double doors
- Add Side lights
- Frame door
- Add Sills

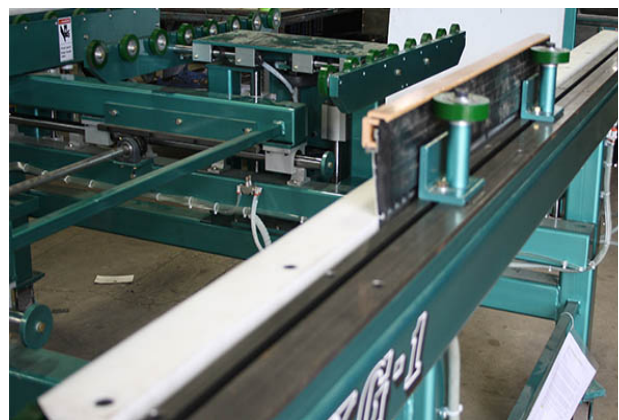


### Tour of Machine



### Sill Rail Example

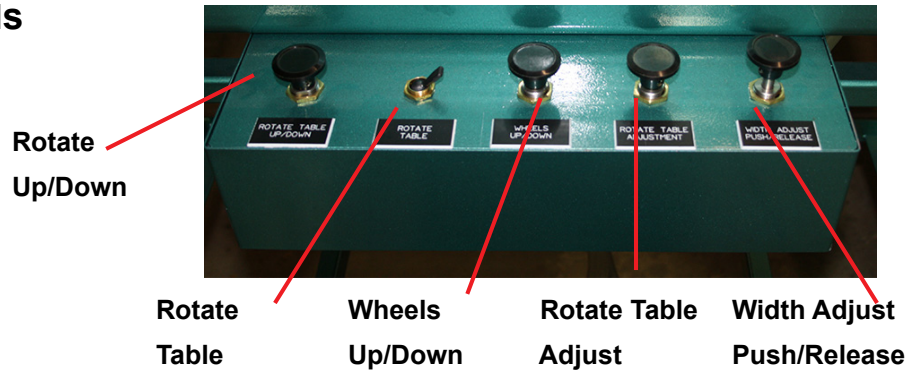
Pace sill in groove at the 'Foot End' off the table



## Operation of the RKG-1

Follow these steps to process single and double doors.

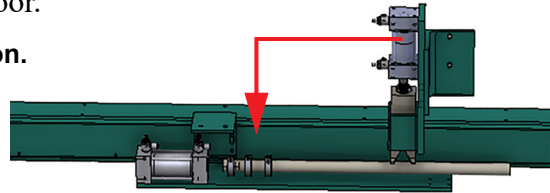
### Controls



The **RKG-1** is air controlled. No electrical power is needed.

1. Set the machine width to match the door.

- Push and *Hold* the **Width Adjust Button**.
- Manually move the fence until the pickle fork is over the preset collar.
- Release button to engage collar



2. Pull **Wheels Up/Down Button** to engage wheels to accept door.

3. Use the **Rotate Up/Down Switch** to move Rotate Table up.

4. Roll in door and use **Rotate Table Adjust Button** to adjust to the width of the door.

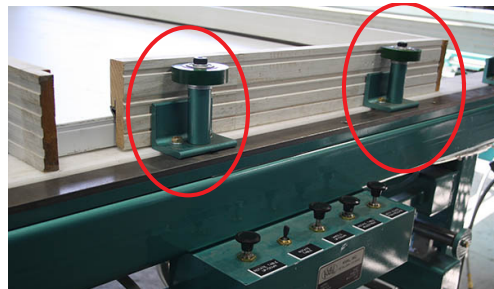
5. Flip the Rotate Table switch to rotate door 90 degrees in the Counter Clockwise direction.

6. Move door to the far edge of the machine.

7. Adjust the door on the top and lower wheels to place the door onto the jamb support plates.

8. Pull **Wheels Up/Down Button** to lower door onto jamb support plates.

9. Adjust wheeled stops to brace against the door.





**If processing single doors:**

1. Perform steps 1 through 9.
2. Activate the clamp door.
3. Add sill and assemble frame (see previous page for sill placement).
4. After completion of assembly, press foot pedal to **Unclamp** door.
5. Push and *Hold* the **Width Adjust Button** to undo width adjust.
6. :Pull **Wheels Up/Down Button** to engage wheels and move door to next machine.

**If processing double doors:**

1. Perform steps 1 through 5.
2. Roll in the second door
3. Flip the Rotate Table switch to rotate door 90 degrees in the Counter Clockwise direction.
4. Roll door down to be next to the first door.
5. Set width of door
6. Pull **Wheels Up/Down Button** to lower door onto jamb support plates.
7. Adjust wheels stops to brace against the door.
8. Add sill and assemble frame.
9. After completion of assembly, press foot pedal to **Unclamp** door.
10. Push and *Hold* the **Width Adjust Button** to undo width adjust.
11. :Pull **Wheels Up/Down Button** to engage wheels and move door to next machine.

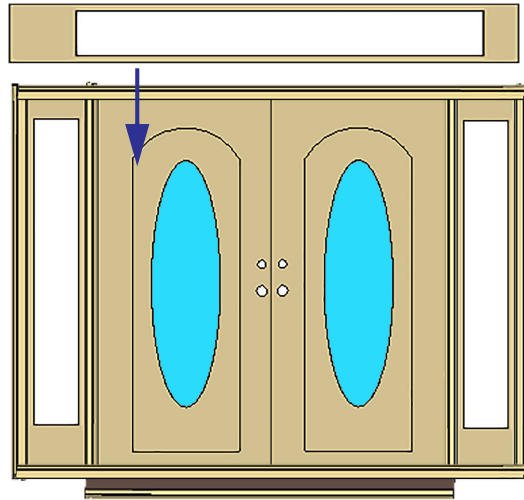


## RKG-2 Door Brick Mold Station

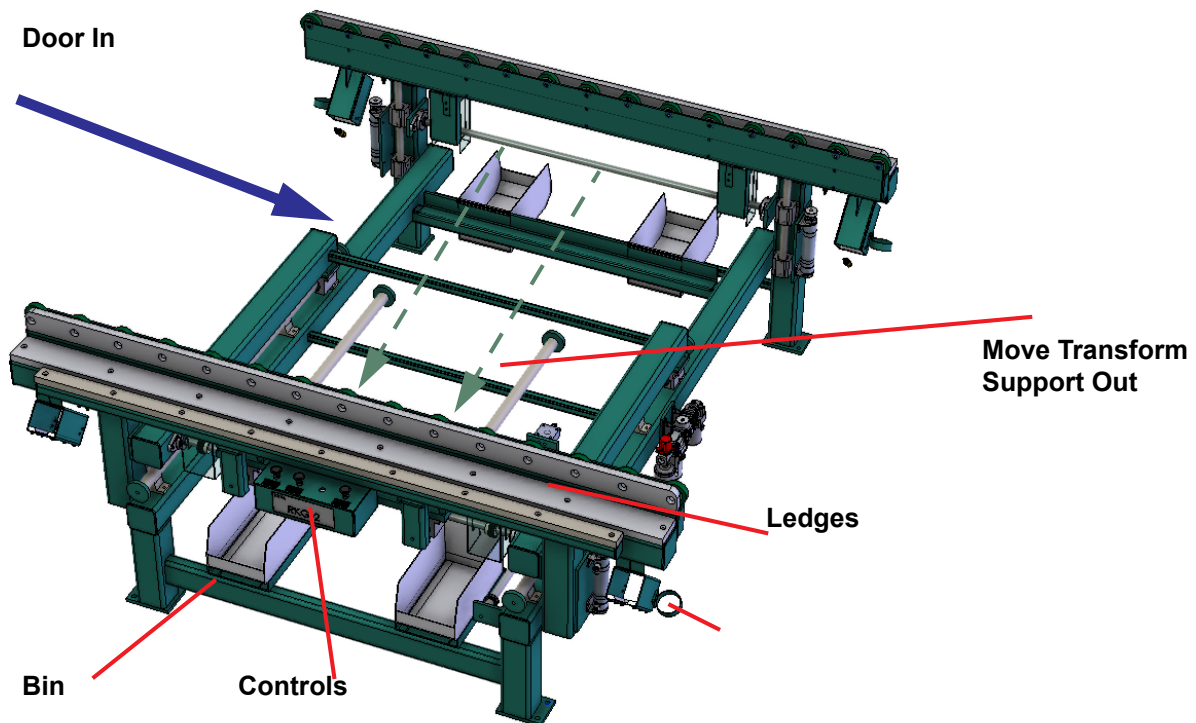
The **KVAL RKG-2 Entry Door Brick Mold Station** is for applying exterior casing to steel, fiberglass, or wood door units with side lights, patio door units or double doors.

### At this Station:

- Add Exterior Casing
- Brick Moulding
- Attach Transform



### Tour of Machine



## Operation of the RKG-2

The **RKG-2** is air controlled. No electrical power is needed.

### Controls



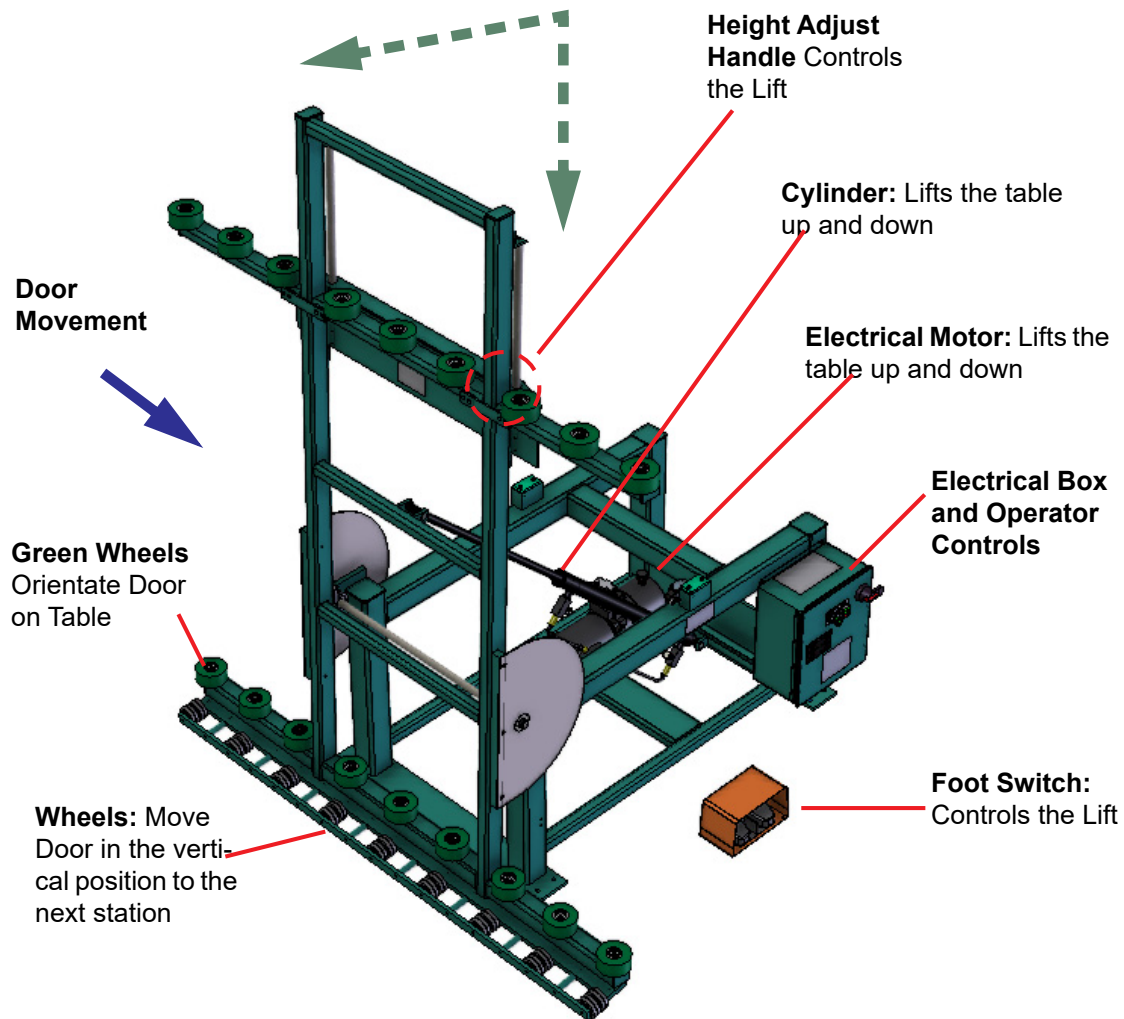
1. Push and *Hold* the **Width Adjust Button**.
  - Manually move the fence until the pickle fork is over the preset collar.
  - Release button to engage collar.
2. Pull **Wheels Up/Down Button** to engage wheels to accept door.
3. Roll in door and position door.
4. Adjust the door on the Top and Lower Wheels to place the door above the jamb support plates.
5. Pull **Wheels Up/Down Button** to lower door onto jamb support plates.
6. If attaching a transform piece, pull the **Transform Support Button** and slide on support to correct dimensions.
  - Attach transform.
7. When completed with process, reverse width adjust steps.
8. Pull **Wheels Up/Down Button** to engage wheels to move door out to next machine.

## RKG-3 Entry Door Upright Conveyor

The **KVAL RKG-3 Entry Door Tilt Up Station** is designed to raise assembled entry door units from a horizontal to a vertical position, for feeding into a **RKG 4, RKG 3-A Upright Clamp Conveyor**.  
Operation

Power the machine, See “Powering Operations” on page 2-6

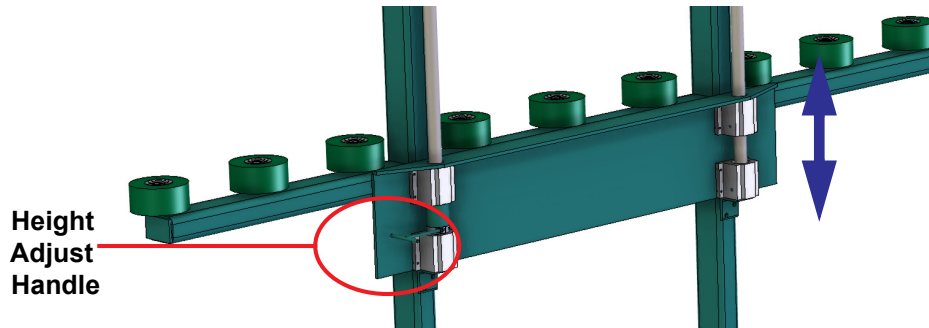
### Tour of Machine



## Operation of the RKG-3

Power the machine, See “Powering Operations” on page 2-6 .

1. Adjust frame to the height of the door.
  - Loosen assembly with handle.
  - Move to desired position.
  - Tighten to lock in assembly.



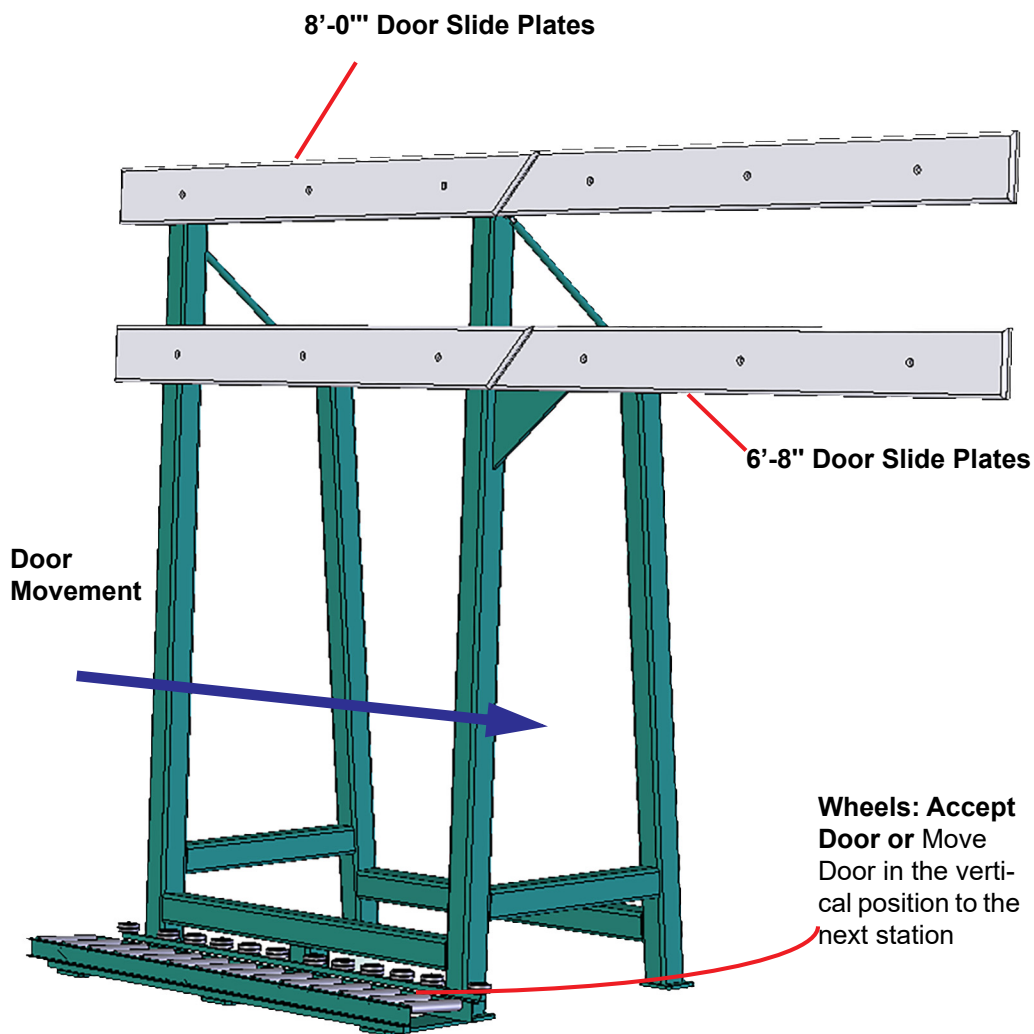
2. Roll in door and position door.(machine in the horizontal position)
3. Engage Foot Switch to move door to the vertical position.
4. Roll door out.
5. Engage Foot Switch again to return to horizontal position.

## RKG-3A Entry Door Upright Conveyor

The **KVAL RKG-3A Entry Door Upright Conveyor** is used to receive the door unit after it has been raised to a vertical position by the RKG-3 and to align the door unit with the **RKG-4** or **RKG-5 Entry Door Upright Clamp/Conveyor**.

The **RKG-3A** may be used as a work station to install caulking in the sidelight frames and to set the sidelight panels into the frames. The **RKG-3A** will accommodate entry door units from 6'-8" high to 8'-0" high.

**Note:** May apply caulking to the sidelights at this stage for get ready for the RKG-4 machine

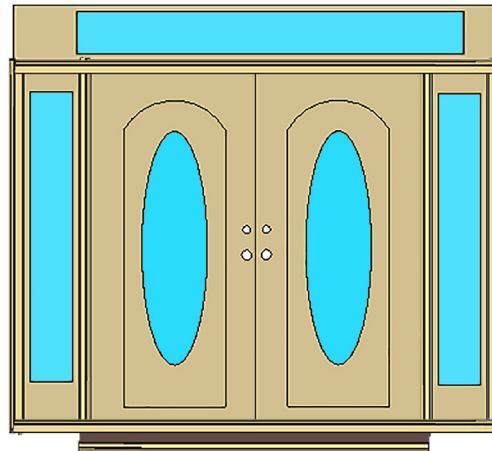


## RKG-4 Entry Door Upright Clamp Conveyor

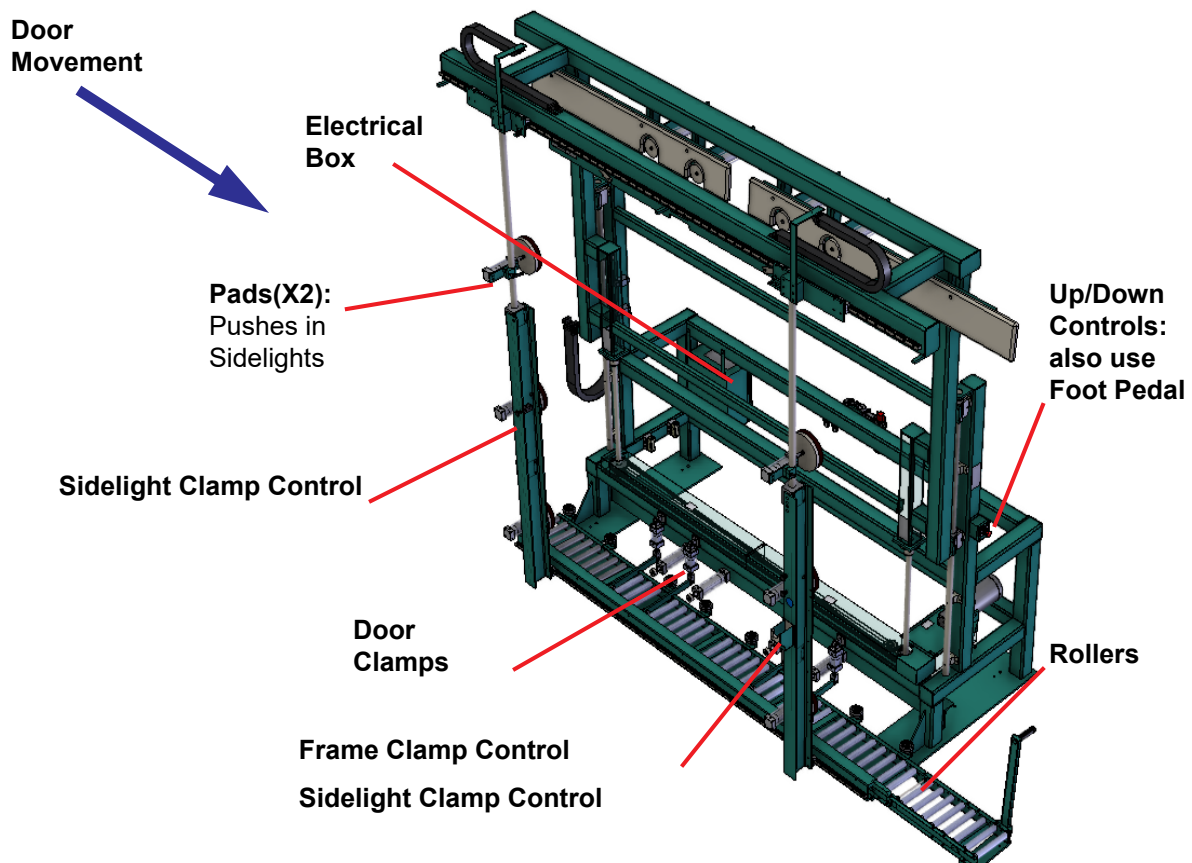
At the KVAL RKG-4 Entry Door Upright Conveyor install sidelight panels in steel, fiberglass, or wood door units with sidelights, or patio door units.

### At this Station:

- Press Sidelight in Panels
- Secure Sidelight Panels
- Inspect

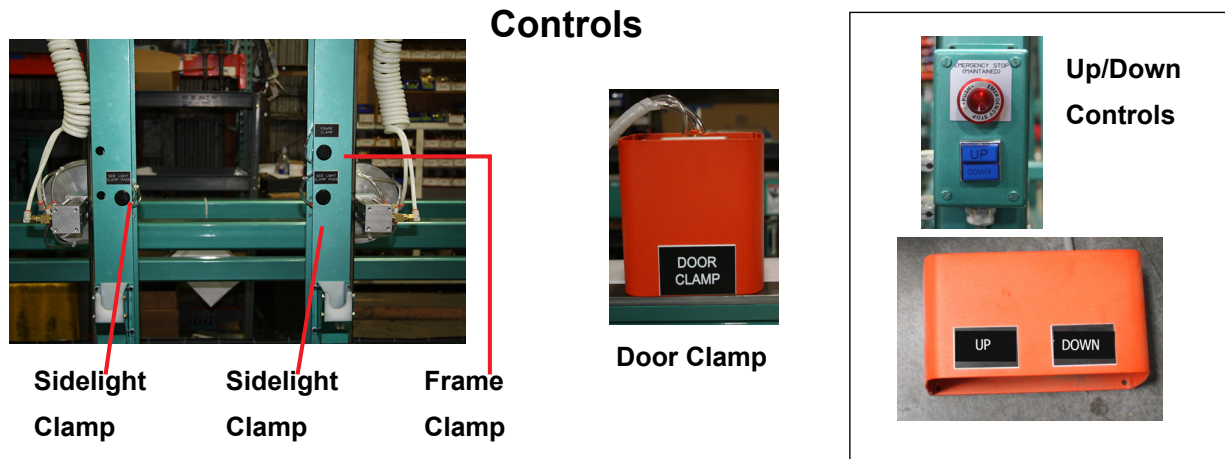


### Tour of Machine



## Operation

Power the machine, See “Powering Operations” on page 2-6



1. Adjust machine to the height of the door (**Up and Down Controls**)
2. Roll in the door from previous machine
3. Make Sure Window Guards are down.



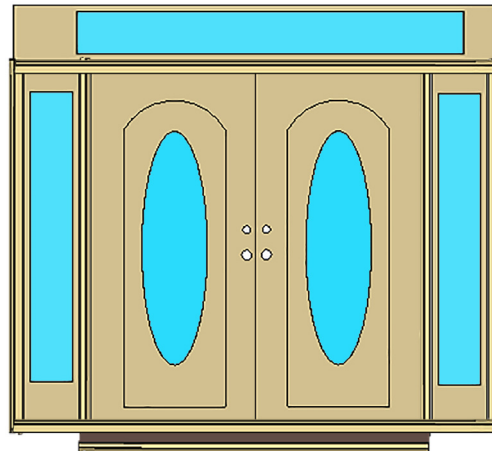
4. Position the Door and push **Foot Pedal** to clamp the door.
  - If further positioning of the frame is needed, use the **Frame Clamp Button** to toggle the clamping, Straighten the frame during toggle.
5. Insert Sidelights
  - Caulk sidelight frames (If not already done)
  - Place windows into sidelight frame
  - Operate the **Sidelight Clamps** to press windows into frame.
  - After sidelight is set, open door and secure through the mull-posts
6. Unclamp door and lean against the brick mold
7. Move door out to next machine

## RKG-5 Tilt and Package Station

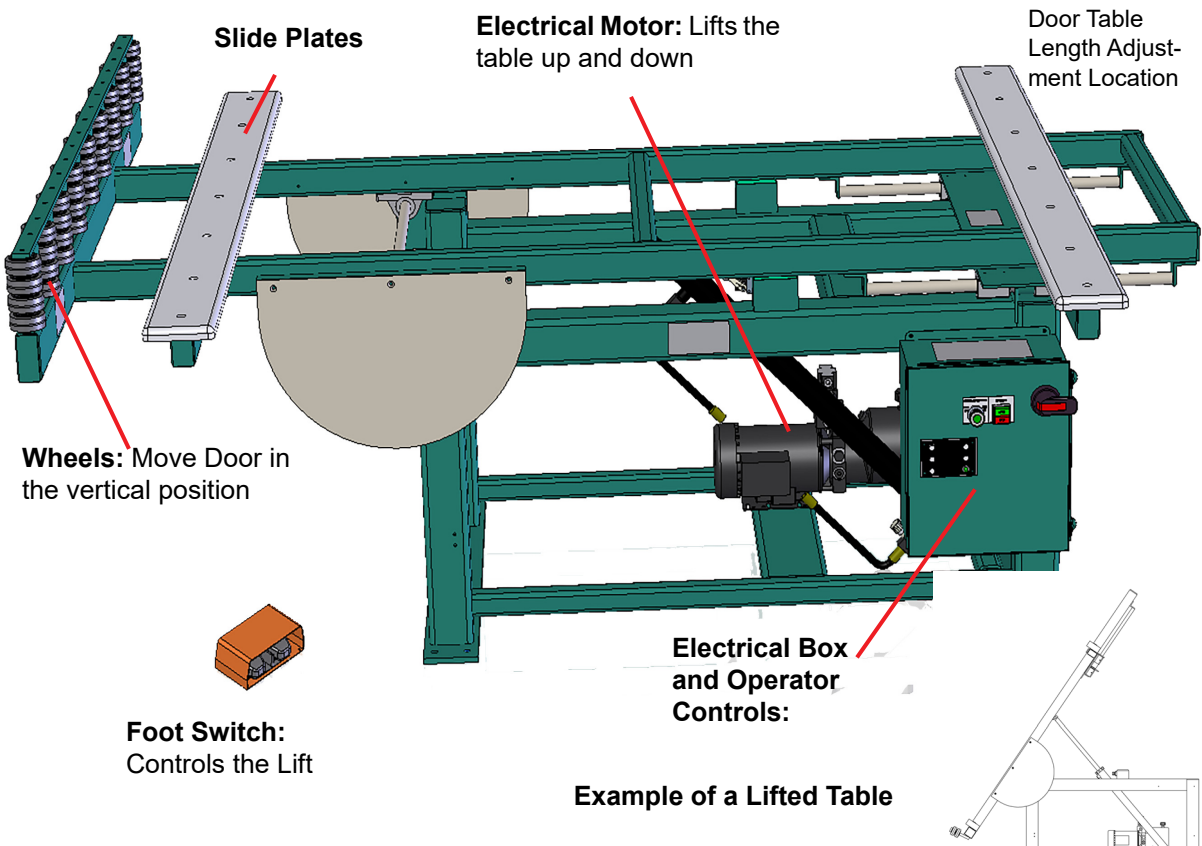
The KVAL RKG-5 Tilt & Package Station is designed to receive entry door units in a vertical orientation from the RKG-4 or RKG-3A, and gently lower them to a horizontal position.

### At this Station:

- Inspect
- Package for Shipping



### Tour of Machine



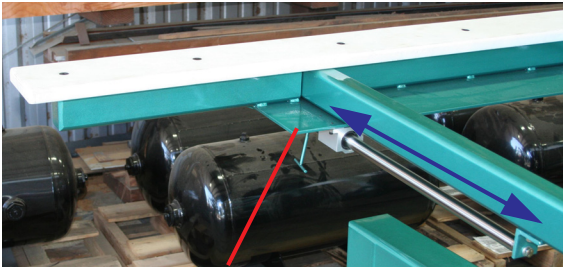


## Operation

Power the machine, See “Powering Operations” on page 2-6

1. Adjust frame to the height of the door.
  - Loosen assembly with handle.
  - Move to desired position.
  - Tighten to lock in assembly

### 8'-0" Position



**Loosen Handle and slide the End of the Table to the Stop**  
**Re tighten the Handle**

### 6'-8" Position



2. Roll door in with the machine in the vertical position
3. Use **Foot Pedal** to put the machine into the horizontal position.
4. Complete inspection and packaging



---

## CHAPTER 3 Maintenance of the RKG Series

This chapter describes preventative maintenance steps for *KVAL RKG Series*. The content is geared to guide technicians to keep a regular maintenance schedule for your KVAL machine. Keeping your KVAL machine maintained is an important piece for successful operation of your door production process.

---

### Chapter 3 at a Glance

<b>Maintenance Schedule</b>	<p>This section describes the assemblies to schedule for maintenance.</p> <ul style="list-style-type: none"><li>• Daily</li><li>• Weekly 5</li><li>• Six Month Checkups</li></ul>	<a href="#">Page 3-2</a>
<b>Lubrication Requirements</b>	<p>This section describes the lubrication requirements for the machine, including types of lube to use. This section includes:</p> <ul style="list-style-type: none"><li>• <b>Linear Bearings, Flange Bearing, and Pillow Blocks</b></li><li>• <b>Gear Motor Lubrication Requirements</b></li><li>• <b>Ball Screws</b></li><li>• <b>Description of Air Input System</b></li><li>• <b>Adjusting the Air Line Lubricator</b></li><li>• <b>Priming the Air Line Lubricator</b></li></ul>	<a href="#">Page 3-4</a>



## Maintenance Schedule

KVAL recommends the following maintenance schedule to ensure that the machine operates properly.

### Daily, Monthly, Six Month Maintenance

Daily Preventive Maintenance	
Op	Operation Description
Clean	Blow off dust from the entire machine. Wipe down the outside of the machine with a clean dry cloth.
Check	Check tooling for wear.
Clean	Wipe off the photo eyes with a clean dry cloth, and check to ensure that all fastening nuts are snug.
Check	Check the air pressure to make sure it is set at 80 psi to 100 psi.
Clean	Empty any Dust Collection Units.
Check	Check for obstructed flow when excessive sawdust appears.
Check	Check the air filter water trap. Empty if full.

Weekly Preventive Maintenance	
Op	Operation Description
Check	Check the machine for smooth motion through a complete door cycle
Clean	Clean linear bearings and the chrome shaft with a clean dry cloth, then lubricate.
Check	Check all air lines & electrical wiring for kinks or rubbing.
LUBE	Refill lubricator with an ISO 32 standard hydraulic oil (KVAL part# SYSLUBG)

Six Month Preventive Maintenance	
Op	Operation Description
Clean	Wash filter and lubricator bowls with soapy water.
LUBE	Grease all bearings and tighten all bolts. Access to some grease fittings is difficult and will require a special needle point grease tip (supplied with your system).
Clean	Clean and lubricate all slides and cylinder rods with dry silicone spray.
Tighten	Tighten all bolts.
Back-up	Backup computer software.
LUBE	Lubricate linear bearings and chrome shafts with silicone.

## Lubrication Schedule

KVAL recommends the following lubrication schedule to ensure that the machine operates properly.

**TABLE 3-2. Recommended Lubrication Schedule**

Type of Assembly	Recommended Schedule	Recommended Lubrication Type
Linear Bearing	Every 250 Hours of Machine Operation	Dura-Lith Grease (KVAL P/N Lube EP-2)
Pillow Block Bearing		
Flange Block Bearing		
Ball Screw	Every 80 Hours of Machine Operation	
Idler Shafts (Pulley)	Monthly	
Tapered Bearing	One Pump 4 Times a Year	
Air Line Lubricator	One drop of oil every 2 or 3 cycles Check the lines every week to two weeks Note: Some CNC Machines drop every 5-10 cycles.	Either lubricant listed below is approved to use. <ul style="list-style-type: none"> <li>• KVAL P/N SYSLUBG</li> <li>• Chevron AW Hydraulic Oil 32</li> <li>• G-C lubricants light AW R&amp;O</li> <li>• Mobile DTE 24</li> <li>• Shell Tellus32</li> <li>• Gulf Harmony 32</li> </ul>

### Typical Lucubration Kit

KVAL Part Number: LUBEKIT



## Lubrication Requirements

This section describes the parts of the machine that require periodic lubrication, and specifies the lubricants. In addition, it explains how to maintain the lubrication systems on the machine.

If the bearing is equipped with a grease fitting (Zerk Fitting).

The Zerk fitting is basically a valve that opens under pressure to allow lubricant to pass through a channel and be forced into the voids of the bearing. When the pressure stops, the ball returns to its closed position. The ball excludes dirt and functions as a check valve to prevent grease escaping back out of the fitting.

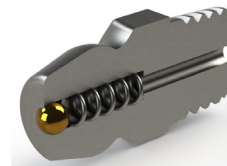
The ball is almost flush with the surface of the fitting so that it can be wiped clean to reduce the amount of debris carried with the grease into the bearing.

**Note:** Bearings without grease fittings have been pre-lubricated at the factory and do not require further lubrication.

**Note:** Clean excess grease to avoid contact with feed belts, clamping areas, or the door.



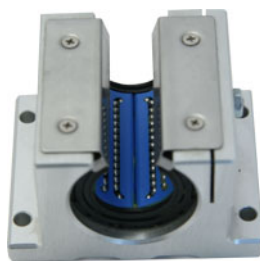
**Zerk Fitting**



## Pillow Block Bearing Housings

A pillow block is any mounted bearing where the mounted shaft is in a parallel plane to the mounting surface, and perpendicular to the center line of the mounting holes, as compared to different types of flange blocks or flange units. The type of rolling element defines the type of pillow block.

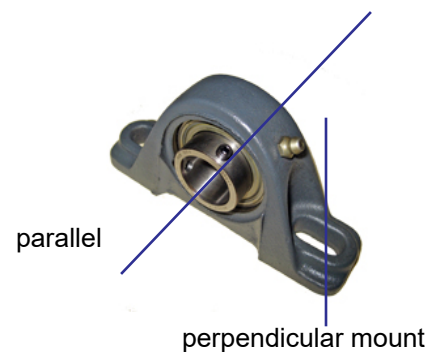
**Opened Pillow Block**



**Closed Pillow Block**



**Hub Style**



### Greasing

Approximately 1 Gram (one pump from grease gun) of Dura-Lith Grease (KVAL P/N: Lube EP-2).  
**Every 250 hours of operation.**

**FIGURE 3-2. Pillow Block Bearings**

## Flange Bearing Housings

A flange bearing is designed to aid in mounting and positioning. The lip of the flange helps center and align the bearing.

Flanges are also used with bearings on external housings used to mount a bearing unit. A mounted bearing unit acts as a system to position the bearing securely for reliable operation.

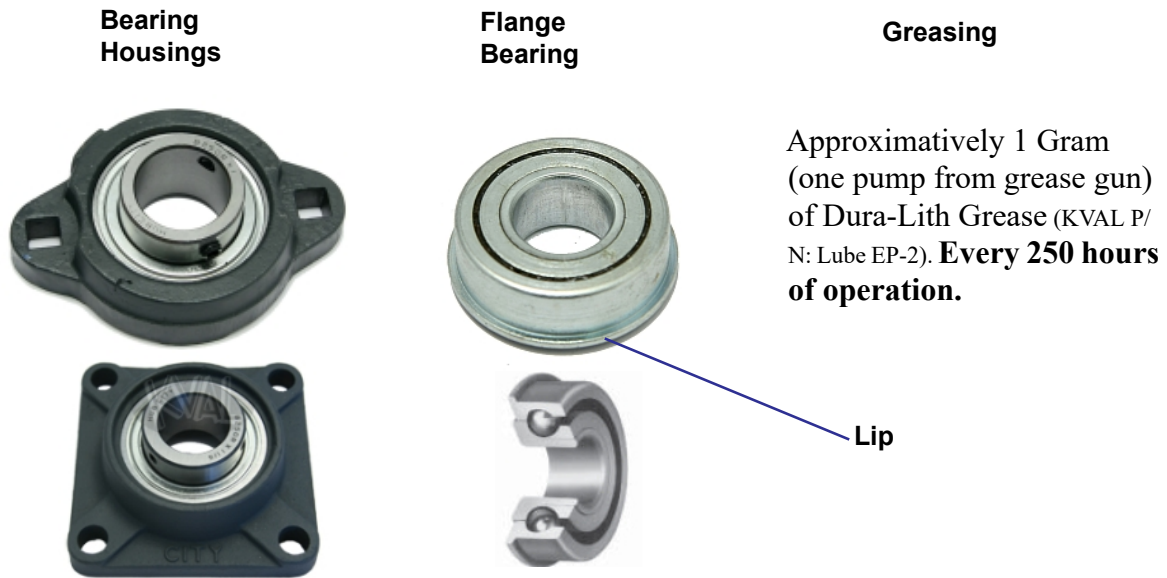


FIGURE 3-3. Flange Bearings

## Ball Rail Bearing

**Ball Rail Bearings** are linear bearings that are attached to positioning rails. In most cases, the bearings are attached to assemblies to move them in the X,Y, or Z direction.

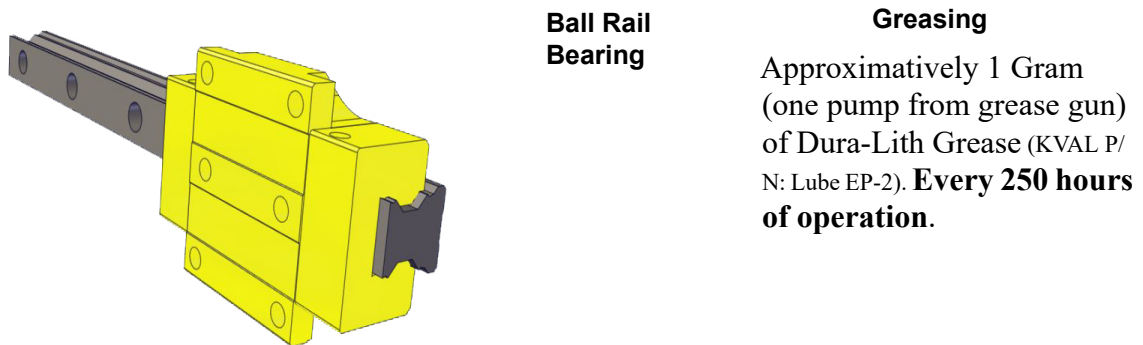


FIGURE 3-4. Ball Rail Bearings

## About Taper Bearings

Taper bearings are used for moving the axes of heavy loads with stability. The tapered roller bearing in combination with lubricants is extremely durable and is used in applications involving rotating axle and transmission shafts.

**Note:** Bearing durability is such an asset that the bearing blocks often require no maintenance for the life of the machine.

Cross Section of  
Tapered Bearing



Greasing  
Recommend One Pump a  
Year

Tapered Bearing

FIGURE 3-5. Sample of Tapered Bearing

## Tapered Bearing Housings

The taper bearings differ from other machine bearing assemblies, in that they are in a sealed environment. To identify a **Tapered Bearing Housing**, look at the enclosure and verify there are seals between the screw and the housing.

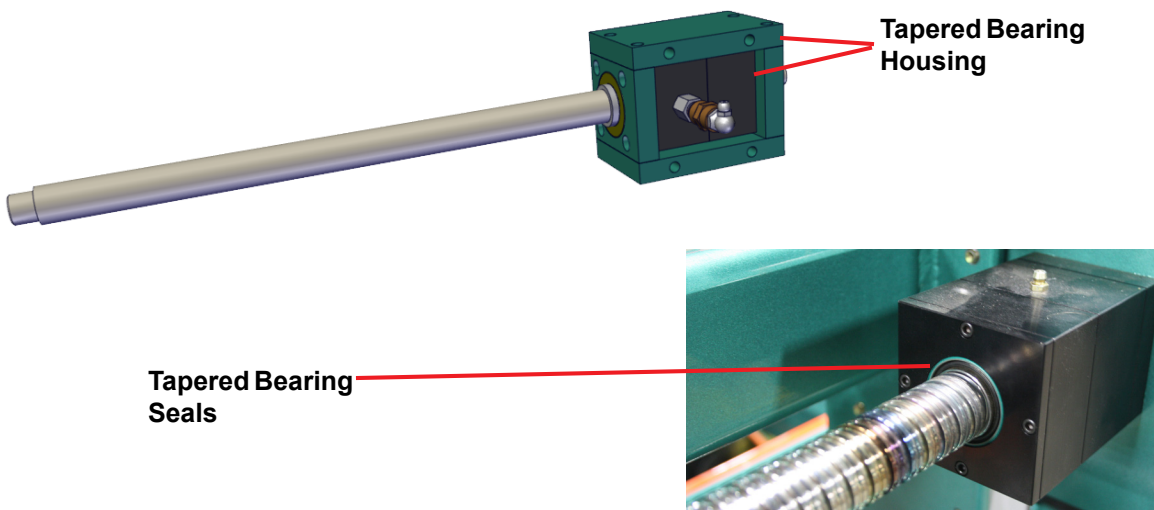


FIGURE 3-6. Tapered Bearing Housing

## Ball Screw Nut

The **Ball Screw Nut** is an assembly with recirculating ball bearings that interfaces with the ball screw. The ball screw drive and the ball screw nut create very low friction coefficients resulting in a smooth, accurate, efficient movement.

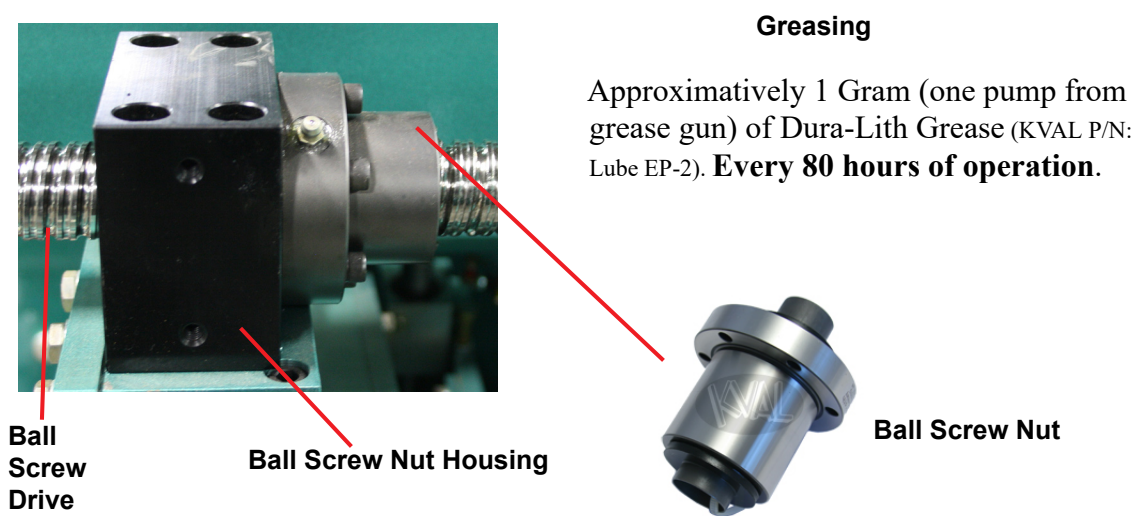


FIGURE 3-7. Example of a Typical Ball Nut

## Ball Screw Drive Assembly

Including the **Ball Screw Nut** other types of bearings may be included on the assembly. The figure below shows a typical **Ball Screw Drive Assembly**.

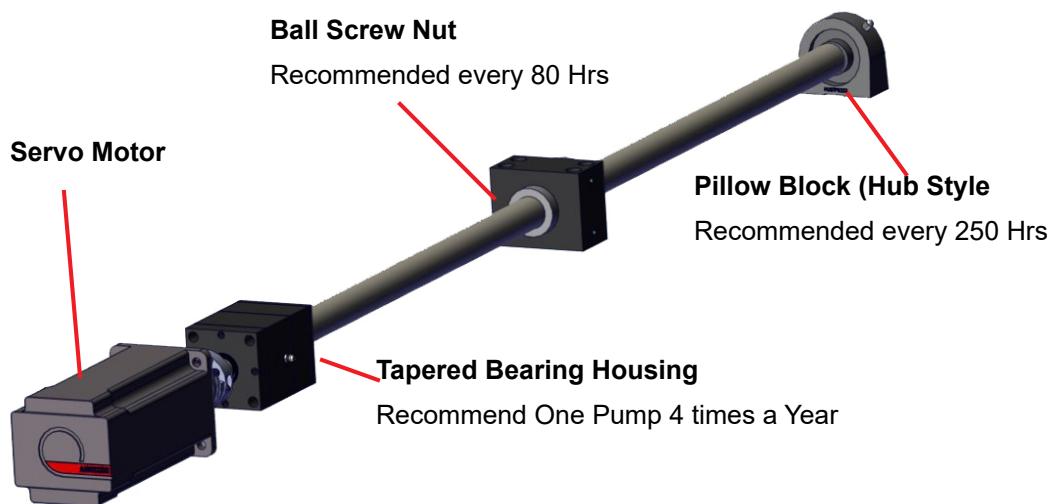


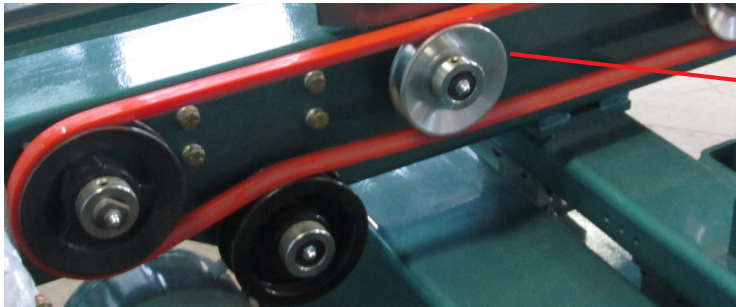
FIGURE 3-8. Ball Screw Drive Assembly



## Pulley and Idler Shafts

Transport systems on the machine contain pulleys and a belt to transport the door in and out of the machine. Each pulley contains an idler shaft that has a zerk fitting to apply grease. An opening in the idler shaft dispenses grease to the inner diameter of the pulley.

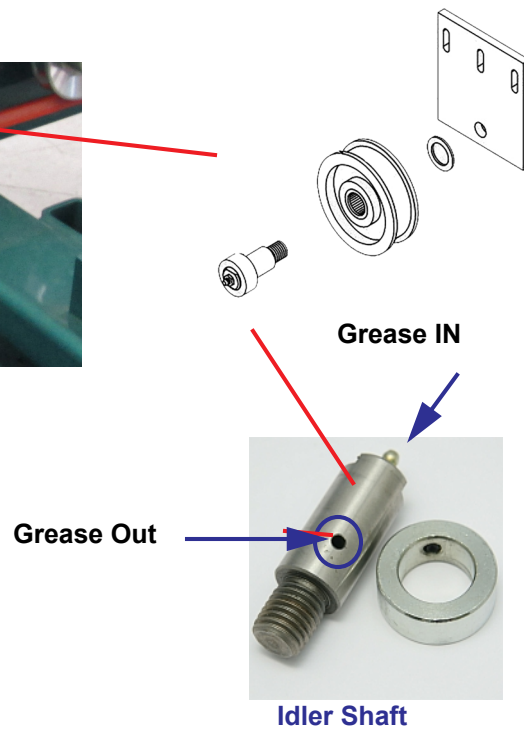
**Pulley in Action**



**Note:** It is important not to overfill the Idler Shaft. Avoid getting excess grease on the belts

Approximately 1 Gram (one pump from grease gun) of Dura-Lith Grease (KVAL P/N: Lube EP-2). **Monthly**

**Breakout of Pulley Assembly**



## Description of Air Input System

There are two types of air inputs on KVAL machinery. Not all machines have lubricator option installed. Check your machine or Air prints to verify installation.

### Air Input with Lubrication

The air input system takes in shop air and supplies clean dry air (CDA) and lubricated air to the machine. The clean dry air is diverted to blow off nozzles. The lubricator, located after the CDA filters, delivers the lubricated air to valve banks and air cylinders.

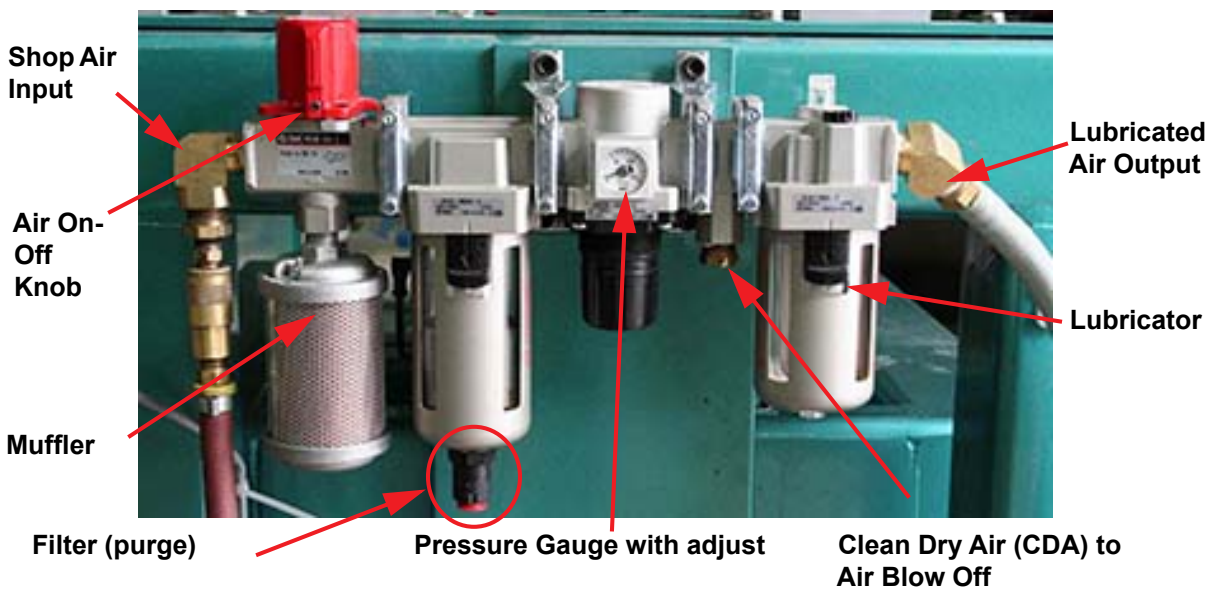


FIGURE 3-9. Typical Air Line Filter and Lubrication System

### Adjusting the Air Line Lubricator

Using the knob on the top of the lubricator, adjust until one drop per every other cycle is used (as observed through sight glass.)

(Sight Glass). When the oiler has run dry, open the knob all the way until flow begins. Once you have a steady flow, tighten knob back down until you have one drop per every other cycle.

Drop will form at end of cane shaped tube visible inside glass.

#### Top of Lubricator



## Priming the Air Line Lubricator

New and used machinery run out of oil from time to time. It is a good practice to check your machine lubricator to insure that it is putting the proper dose of oil in the air lines. Usually 1 drop of oil every other cycle is a good rule of thumb. The approved list of oil for lubricators is as follows:

- KVAL P/N SYSLUBG
- Chevron AW Hydraulic Oil 32
- G-C lubricants light AW R&O
- Mobile DTE 24
- Shell Tellus32
- Gulf Harmony 32

To prime the lubricator, find an air line on the carriage section of the machine that is energized, and disconnect it, allowing the air stream to bleed air pressure away from any persons. Direct the air stream at the machine so you can see when there is an oily film blowing out of the air hose. Repeat this same procedure for the back section and other trouble areas.

It is recommended to check the lines every week to two weeks.

## Air Line Without Lubricator

The air input system takes in shop air and supplies clean dry air (CDA).

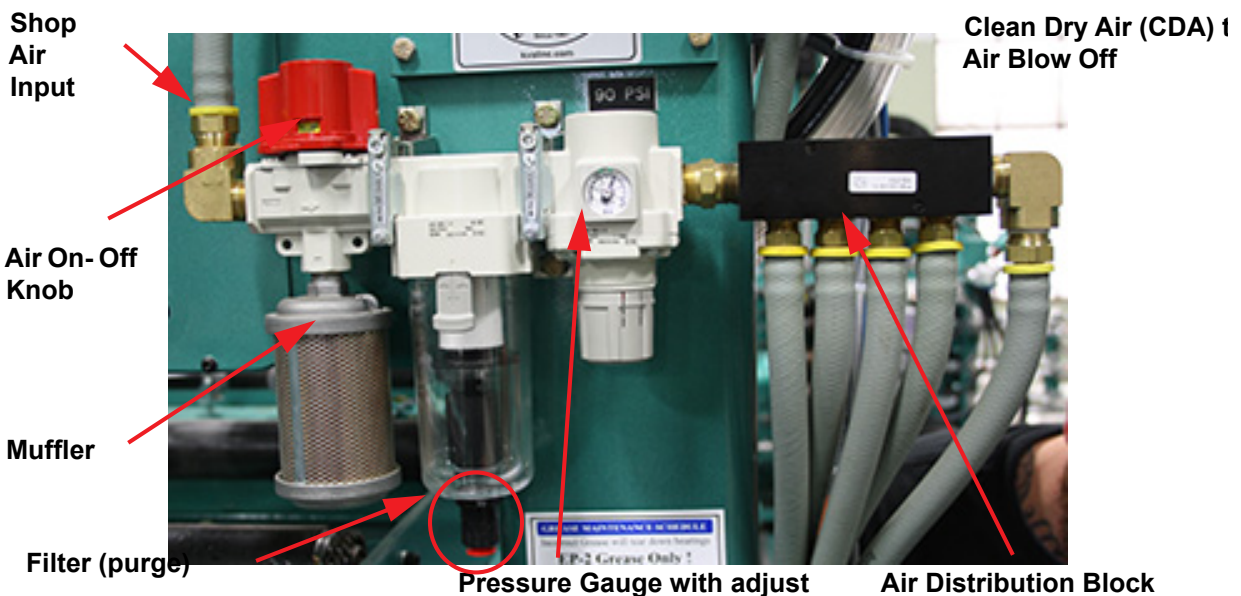


FIGURE 3-10. Air Filter without Lubricator



## CHAPTER 4 Troubleshooting the RKG Series

This chapter describes troubleshooting steps to help technicians solve issues that may occur with your KVAL machine. If help is needed, call or contact our KVAL Service team at (800) 553-5825 or <http://www.kvalinc.com>.

**Note:**

Refer to the Air and Electrical drawings provided with delivery of the machine. The drawings are normally located in the Electrical Panel. If copies are unavailable, contact the KVAL Service Department. Have drawings numbers, model number, and serial number of machine readily available.

---

### Chapter 4 at a Glance

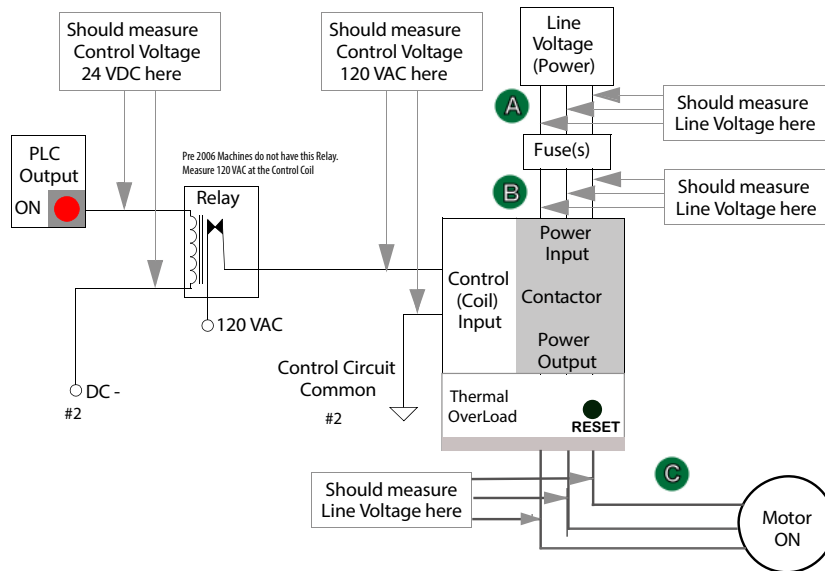
Section Name	Summary	Page
<b>About Contactor Control</b>	Describes a typical contactor control circuit.	<a href="#">Page 4-2</a>
<b>Limit Switches</b>	Troubleshooting Limit Switches	<a href="#">Page 4-4</a>
<b>Troubleshooting Electrical Problems</b>	Includes voltages in the electrical panels, using the Status Light panel to troubleshoot	<a href="#">Page 4-5</a>

## About a Typical Contactor Control

Unlike general-purpose relays, contactors are designed to be directly connected to high-current load devices. Contactors are designed to control and suppress the arc produced when interrupting heavy motor currents. The figure below shows a block diagram of a typical contactor circuit with typical voltages. Thermal overload relays are commonly attached to the contactor. They offer protection for motors in the event of overload or phase failure. A Reset button is included to clear an error in the relay.



High Voltage may cause personnel **injury or death**. Troubleshooting checks *must* be performed by a Qualified Electrical Technician.



**Note:** Pre-2006 machines may not contain the 24 Volt relay. 120 Vac is directly fed into the Control Coil. Check the input circuitry to the Control Coil for 120 Vac.

Schematic Drawing of Contactor and Thermal Overload

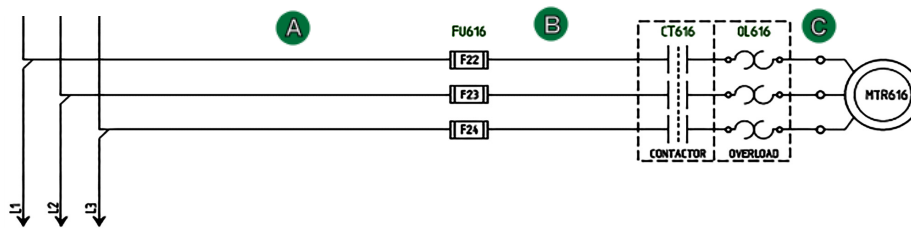


FIGURE 4- 11. Block Diagram of a Common Contactor Circuit

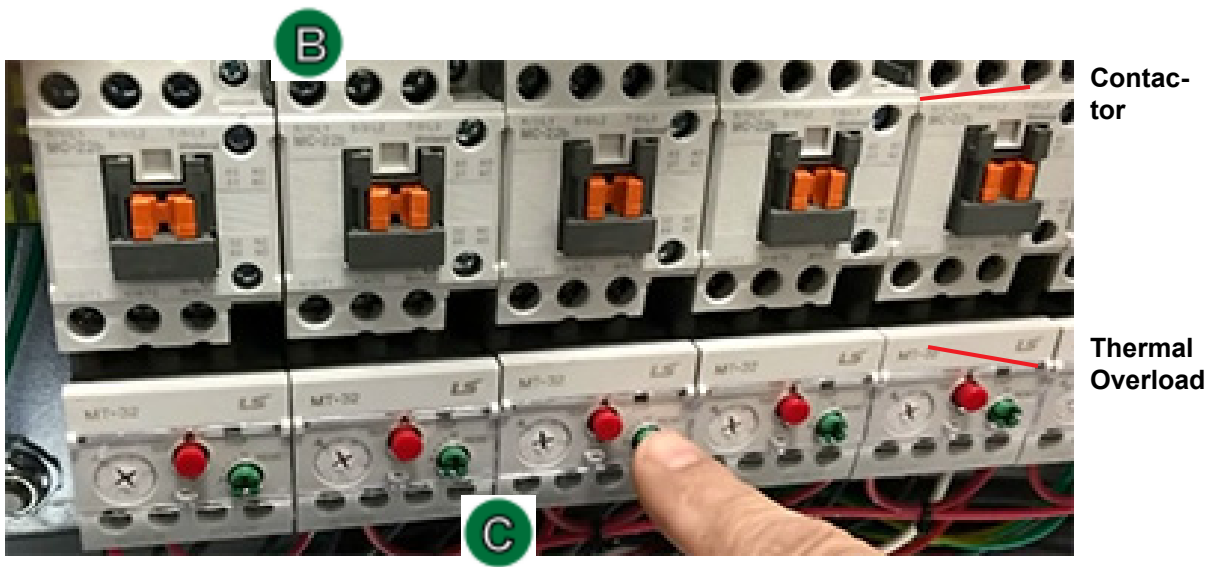


FIGURE 4- 12. Contactor Bank

### About Contactor Troubleshooting

The Thermal Overload Circuit opens the motor circuit when current draw causes the motor to run too hot. The overload limits are set at the factory, do not adjust the limits.

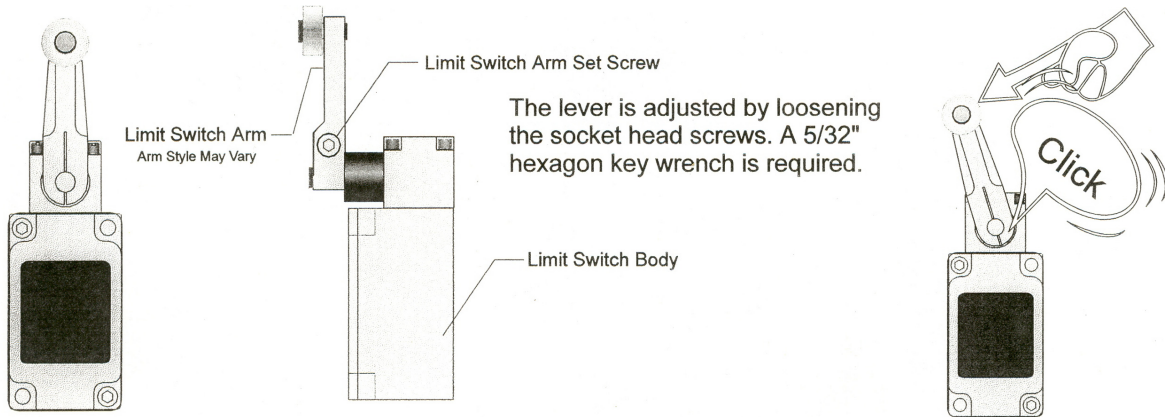
The overloads are normally in series, therefore if one trips, all on that circuit stop working.

Use the Six Light panel as a trigger to check the circuit. See [“Troubleshooting with the Status Light Panel”](#) on page 4-7 .

1. Open the Main Electrical Cabinet to find the Contactor /Thermal Overload Assembly
2. Press each ‘Green’ Reset button on the Thermal Overload. An audible click will be heard on the tripped circuit. (Take note of tripped circuit.)
3. Once the overloads are reset, verify LED’s are on.
4. Rerun the machine and verify that motor runs without tripping the circuit.
5. If the same overload keeps tripping, verify condition.
6. Follow circuit path using the E-Drawing as a reference.
  - a.Common issues: Check for bad wire, bad motor, or if load is too great for current draw.

## Limit Switches

If a machine suddenly stops in mid cycle check the limit switches, a worn limit switch arm or a misadjusted limit switch is more than likely the cause. Depending on the model of limit switch you receive the amount of “pre-travel” (amount of movement from the arms resting position) is either 5 or 20 degrees before the limit switch actuates (Clicks). If the arm is moved to the full extents of its travel and you do not here the limit switch “Click”, the switch needs to be adjusted here is how you adjust it follow the following drawings.



---

## Troubleshooting Electrical Problems

**NOTE:** Refer to Air and Electrical Schematics provided with delivery of the machine. Schematics are located in the Electrical Panel. If copies are unavailable, contact the KVAL Service Department. Have model number and serial number of machine readily available.

**Warning** The following checks require the electrical panel to be energized. These troubleshooting checks *must* be performed by a **Qualified Electrical Technician**.



The electrical component systems are designed to expedite the troubleshooting process and minimize “down time”. In general, component systems have the input or feed functions at the top. Output or load functions are positioned at the bottom. Most two-voltage electrical panels are designed with the LOW VOLTAGES on the LEFT, and the HIGH VOLTAGES on the RIGHT. The majority of the system components are labeled with numbers that correspond with the electrical prints included in the electrical box door.

Computer controlled machines have signals on the computer that light up when the input or output functions are energized, respectively. Computer controlled as well as non-computer controlled machines have white 120V control power terminal strips. This will indicate power supply from the respective circuits.

PLC controllers also have lights on them for the input and output functions. You can easily find out which circuits are failing by watching the lights turn on or off. Compare the lights on the IDEC or Beckhoff controllers to the electrical print to determine what systems are being affected.

### If the Power Stops During Normal Operation

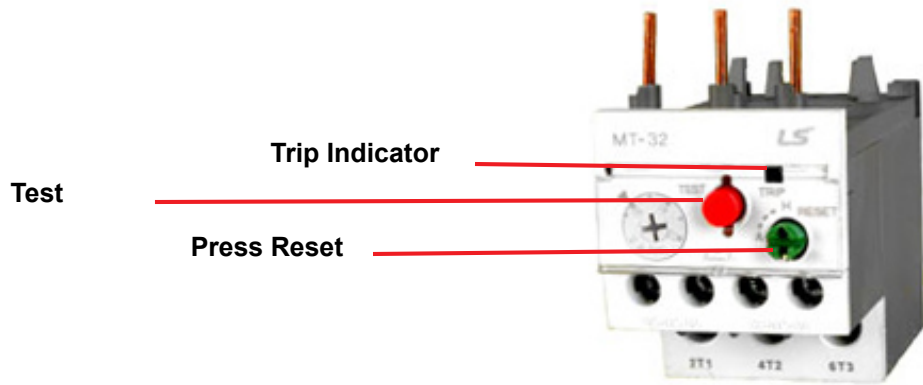
1. Check that the input power disconnect switch is not turned off.
2. Check that all of the emergency stop buttons are in the normal position.
3. Check the Six Lights on the Electrical Panel. See “Troubleshooting with the Status Light Panel” on page 4-7.

### Lockout and Tagout the main power source.

1. Turn the panel disconnect switch in the off position, open the electrical panel door.
2. Observe the disconnect switches. Look for loose or broken wires at the disconnect then at all of the components.
3. Check for continuity of all fuses with an OHM meter. (Fuses need to be removed from the bottom side of the fuse holder before measuring the fuses)



4. With the power off, check for motor overloads by pressing each reset button (usually at the bottom of the panel) in SEQUENCE. If one is tripped there will be a slight resistance to touch and a “click” sound as it is reset.



**Thermal Overload Relay**

### Check for Tripped Circuits

1. Remove lock and tag outs on the main power sources.
2. Manually close disconnect sensors and energize the control circuit or transformer with its respective sensor. Check the Status Light Panel,. If all lights are observed, there are no overloads or emergency stops tripped.

**Note:** Most electrical problems are related to mechanical malfunction (e.g., stuck motors, jammed chain, blocked photo sensors etc.)

**Note:** If a solenoid valve is suspected, and not cleared in the air checks section, it can be electrically jumped to check operation.

## Troubleshooting with the Status Light Panel

The Status Light Panel is located on the Electrical Panel. All six lights are illuminated when the system is in proper working order. The lights turn on in a sequence and will stop at the point where a fault is first detected.

The sequence that the lights turn on are as follows:

1. Control Power (Amber)
2. Overload Relay (Amber)
3. E-Stop (Amber)
4. Stop (Amber)
5. Start (Amber)
6. 24VDC (Green)



If one or more lights are OFF, follow the process below to isolate the cause.

**NOTE:** Be sure to proceed down the table, starting with the CONTROL POWER light.

STEP 1:Control Power (Amber). If light is OFF go to item **A** on [Page 4-8](#).

STEP 2:Overload Relay (Amber) If light is OFF go to item **B** on [Page 4-9](#).

STEP 3:E-Stop (Amber) If light is OFF go to item **C** on [Page 4-9](#).

STEP 4: Stop (Amber) If light is OFF go to item **D** on [Page 4-9](#).

STEP 5: Start (Amber) If light is OFF go to item **E** on [Page 4-10](#).

STEP 6: 24VDC (Green light is OFF go to item **F** on [Page 4-10](#).

**A**

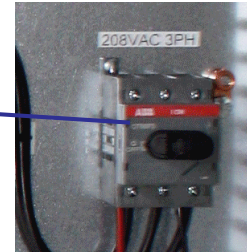
**Control Power Light OFF**

1. Check if the Control Transformer button is pulled out.



2. Is the Disconnect Switch on the main electrical cabinet set to ON?

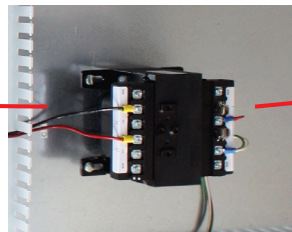
Switch



3. Is there 208, 220, 440, or 575 VAC to the top side (input) of the Control Transformer? If not, check the fuses at the Fuse Block, and the contacts on the Control Transformer button on the switch panel.

**Typical Control Transformer**

Input  
High Vac



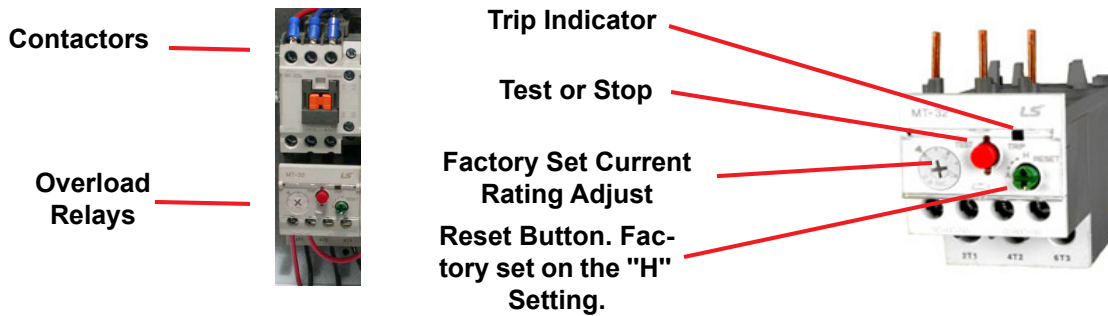
Output  
120 Vac

4. Is there 120 VAC between #1 & #2 on the 120 VAC Terminal Strip? If not, check the fuse on the output side of the Control Transformer. If fuse is good, check power coming out of Control Transformer.
5. If no power on the output side, and there is power going into the top of the Control Transformer, replace the Control Transformer.
6. If there is power at the Control Transformer, check the wiring of the black and white wire going from the Control Transformer to the 120 VAC Terminal Strip.
7. If there is no power between #1 and #2, check the secondary side of the transformer.
  - a. Check between X1 and X2. If no power is measured it is a bad transformer.
  - b. If there is power at X1 and X2, check the other side of the fuse. If now power, replace the fuse.

## B

### Overload Relay Light OFF

1. Check Motor Overload Circuits
2. With power on, check the trip indicator LED on the overload. If indicator is orange, press the Reset Button to reset the overload circuit. Retest the Machine.



## C

### E-Stop Light OFF

Check if any E-Stop buttons are pulled out.

**NOTE:** Location and quantity of E-Stop buttons varies depending on customer need. Typical locations for E-Stop buttons are near the Rear Access Gate and near the Tool Changer Access Gate



## D

### Stop Light OFF

Check for 120 VAC between #2 and #4. If there is voltage, press the Start button. If no voltage, check the Stop button to make sure it is all the way out and not stuck in, then check the contact to make sure it is closed. If still no voltage, check the wiring.



**E**

**Start Light OFF**

If the Start light remains unlit, push in the Start button and hold it in while a second person checks for voltage between #2 and #5. If there is 120 VAC, replace the ACR relay. If there is no voltage while the button is held in, check the wiring or the contact on the **Start** button.



**F**

**24VDC Light OFF**

First isolate the power supply. Check between DC+ and DC- for 24VDC. If no DC voltage, disconnect the output (V+) wire from the 24VDC power supply and check for DC voltage where those wires were disconnected.

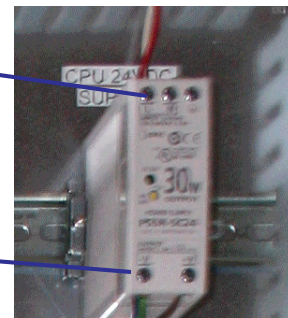


**If no voltage:**

Check the input side for 120 VAC. If no 120 VAC, check the fuse. If there is 120 VAC and no 24VDC, replace the 24VDC Power Supply.

**Input 120 VAC**

**Output 24 VDC**



**If there is 24VDC:**

Reconnect the (V+) wire to the 24VDC power supply.

Trace the output wire to the DC terminal block.

Disconnect all (+ 24V positive) wires from the + DC from the DC terminal block except the + output wire from the + 24VDC power supply.

Check for +24VDC at between any -DC and +DC terminal on the DC Terminal block.

Reinstall the (+ 24V positive) wires one by one, checking for +24VDC after installing each. If at any point no voltage is found trace the last reinstalled wire and check for shorts.

---

# Index

---

## A

air input system  
  description3-9  
  lubricator3-9  
air line lubricator  
  adjusting3-9  
  priming3-10  
air line lubricator, maintenance schedule3-3

## B

ball screw, maintenance schedule3-3

## C

control panel light  
  not on? troubleshoot4-8  
control power indicator light description2-4  
control transformer switch  
  power up2-6, 2-7

## D

dura-lith grease, bearing lube3-3

## E

electrical panel2-3  
e-stop light  
  description2-4

## F

flange block bearing, maintenance schedule3-3

## I

Idler Shaft3-3  
in-feed section  
  key assemblies2-3

## K

KVAL, getting help1-17

## L

linear bearing, maintenance schedule3-3  
lockout and tagout Guidelines1-15  
lockout procedure1-13  
Lubrcation Schedule3-3  
Lubrication3-3  
Lubrication Schedule3-3

Idler Shaft3-3

## M

maintenance  
  daily3-2  
  six month3-2  
  weekly3-2

## O

operator's tour  
  top view2-3  
overload relay light description2-4

## P

pillow block bearing, maintenance schedule3-3  
PLC  
  location in main electrical panel2-3  
power  
  lock out procedure1-13  
power up  
  troubleshooting4-5  
powering  
  up and down machine2-6  
product return procedure1-17

## R

return material authorization (RMA)1-17  
returning the product to Kval1-17  
RKG-3 Entry Door2-8, 2-14  
RKG-3A Entry Door Upright Conveyor2-16  
RKG-5 Tilt and Package Station2-19

## S

safety guidelines1-8  
Safety Sign Off Sheet  
  Safety Concerns1-20  
sensors  
  types2-5  
service center, contacting information1-17  
six light panel  
  description2-4  
  sequence list2-4  
start light  
  description4-10  
start light description2-4

---

---

start machine button  
power up2-6  
status light panel  
description4-7  
use as troubleshooting key4-7  
stop light description2-4

**T**

tagout procedure1-13  
Tapered Bearing3-3  
troubleshooting  
using status lights4-7

**Z**

zerk fittings3-4  
locations3-4  
zero-energy start-up  
clean up1-15  
inspect1-15











<http://www.kvalinc.com>



**Contacting KVAL**

Phone and Fax:

In the U.S and Canada, call (800) 553-5825 or fax  
(707) 762-0485

Outside the U.S. and Canada, call (707) 762-7367  
or fax (707) 762-0485

Email: [service@kvalinc.com](mailto:service@kvalinc.com)

<http://www.kvalinc.com>

**Customer Service**

Mailing address:

Customer Support Department

Kval Incorporated

825 Petaluma Boulevard South

Petaluma, CA 94952

---