

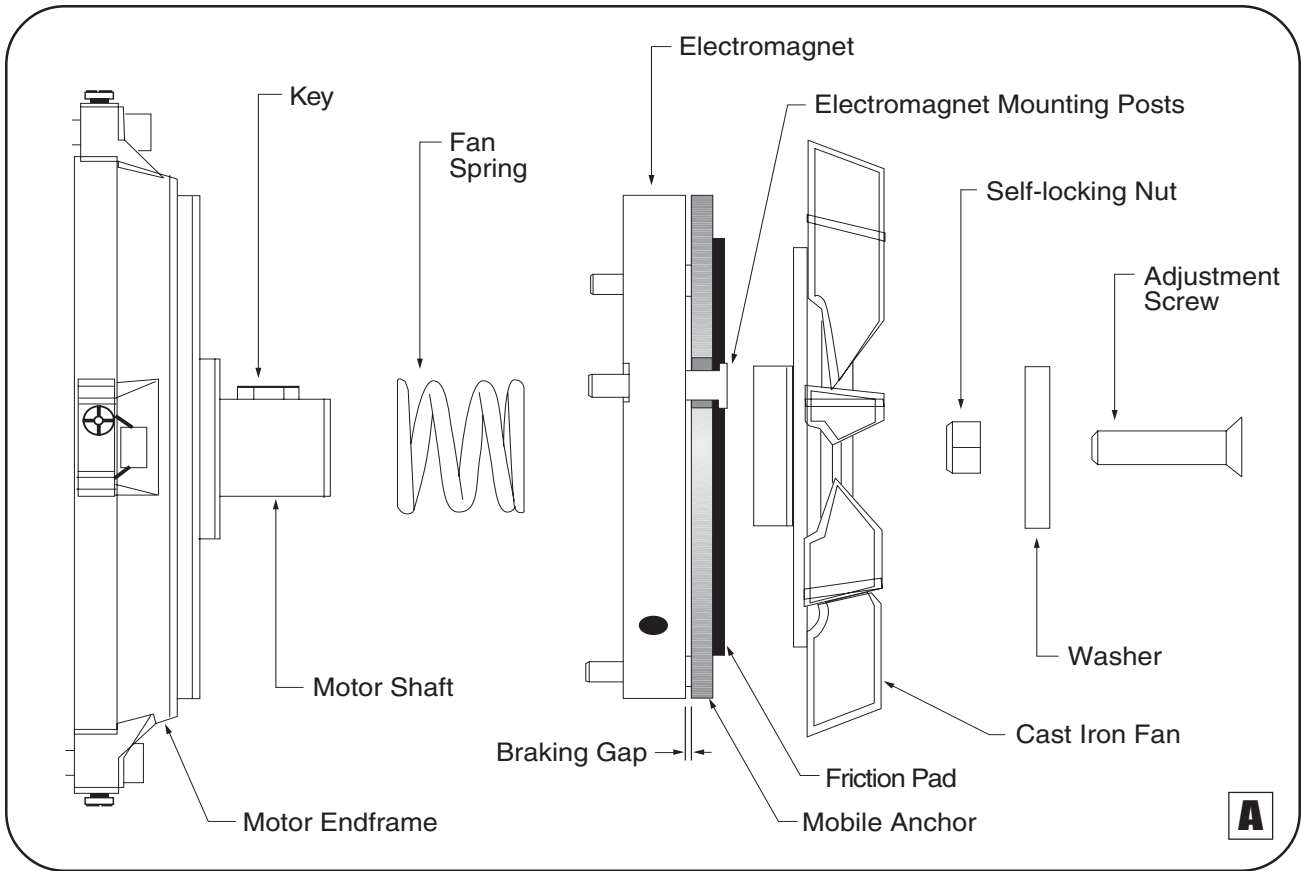
**Rojek Woodworking Machinery**  
Braking Motor Technical Guide





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# SECTION 1

## Introduction

**Rojek woodworking machines** are engineered with the latest European safety and dust collection designs. Many of the woodworking machines manufactured by Rojek are equipped with motors that incorporate a DC brake. This feature provides additional safety for the machine operator.

This guide details the steps for adjusting the DC brake, troubleshooting typical problems and, if necessary, how to remove and replace the brake or any of its component parts. This 1st section contains a brief summary of the basic workings of the DC brake. Understanding how the DC brake operates can save considerable time and frustration later.

Please pay close attention to all “**Warnings**” and “**Cautions.**” Warnings refer to personal injury risks, Cautions refer to risks to the machine.

### How The Brake Works (refer to Exhibit A)

#### Major Components of the Brake

##### Electromagnet

The **Electromagnet** is attached to the Motor Endframe with the three Mounting Posts and remains fixed. The heads of the Mounting Posts also act as travel guides for the **Mobile Anchor**.

##### Mobile Anchor

Three springs between the **Electromagnet** and the **Mobile Anchor** apply a constant pressure on the **Mobile Anchor**, forcing it away from the **Electromagnet** and against the **Cast Iron Fan**. Permanently attached to the **Mobile Anchor** is a **Friction Pad** whose large surface area provides the Motor with its soft, gradual braking.

##### Cast Iron Fan

The **Fan** is attached to the end of the Motor Shaft with the **Self-locking Nut, Washer and Adjustment Screw**. The **Fan Spring** exerts constant pressure on the **Fan** forcing it away from the Motor Endframe as far as the **Adjustment Screw** will allow.

#### The Brake in Action

With the **Electromagnet** and **Fan** in fixed, stationary positions, the **Mobile Anchor** travels back and forth between the Electromagnet (pulled in by the Electromagnet when the motor is turned on and thus freeing the fan to turn) and the Fan (released by the Electromagnet when the motor is turned off and thus forced against the Fan bringing the Fan and Motor Shaft to a stop). Refer to Exhibit **B** to see this action.

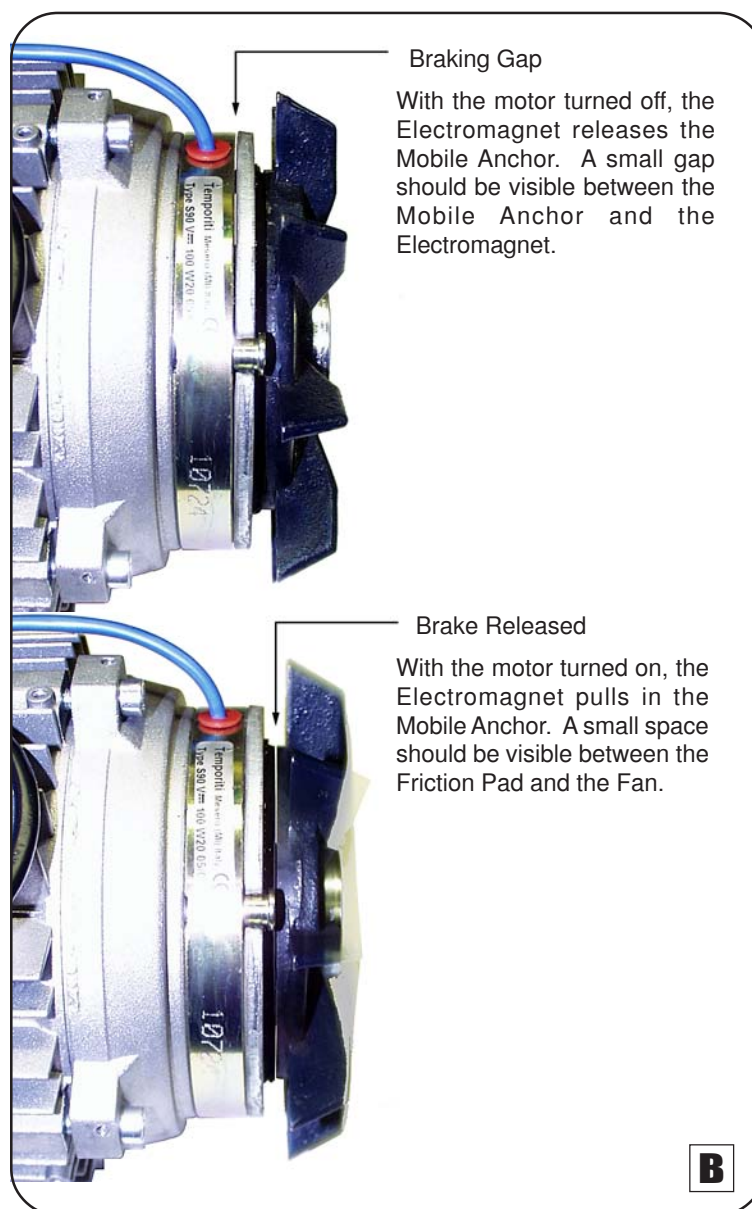


## Section 2

# Brake Adjustment / Normal Operation

For proper Brake operation, the Electromagnet must be able to “pull in” the Mobile Anchor when the Motor is turned on. If the distance between the Mobile Anchor and the Electromagnet, called the Braking Gap, is too great the Electromagnet will not be able to pull the Mobile Anchor off of the Fan.

Once the Electromagnet pulls in the Mobile Anchor, there must be sufficient space between the Friction Pad and the Fan to allow free rotation of the Fan and thus the Motor Shaft. The photo at the bottom of Exhibit **B** illustrates.



## The Braking Gap

Below are the Braking Gap values for various motor models (refer to ID plate on the Motor):

<u>Motor</u>	<u>Gap (mm)</u>	<u>Gap (in.)</u>
M90	0.20	0.0079
M100	0.25	0.0098
M112	0.25	0.0098
M132	0.30	0.0118

The factory specification for the Braking Gap is based on a supply voltage of 230V AC. As the supply voltage decreases, the strength of the Electromagnet decreases. Accordingly, the Braking Gap must then be narrowed to enable the Electromagnet's pull to reach the Mobile Anchor.

On the other hand, if the Braking Gap is too narrow there will not then be enough space between the Friction Pad and the Fan for the Fan to rotate freely when the Motor is engaged.

Consequently, the lower the supply voltage the less tolerance there will be in the adjustment of the Braking Gap.

## How to Adjust the Braking Gap

The Braking Gap is regulated with the Adjustment Screw located at the non-drive end of the Motor Shaft with the Cast Iron Fan (see Exhibits **A**, **C** & **E**). As the Adjustment Screw is tightened, the Fan forces the Mobile Anchor closer to the Electromagnet. It is not necessary to remove the Fan Cover in order to make this adjustment, as shown in Exhibit **C** (see Step 4 below).



*Adjusting the braking gap through the fan cover.*

### Steps:

1. Turn off the machine and disconnect it from the power source.

**Warning:** Failure to turn off the machine and disconnect it from the power source before performing any work on the motor may result in serious injury.

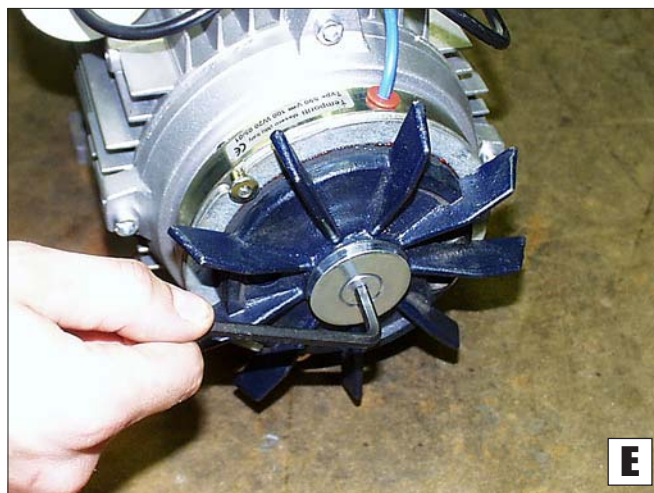
2. Remove the Fan Cover, as shown in Exhibit **D**, if necessary to view or measure the Braking Gap, or to troubleshoot a Brake problem.



Removing the fan cover.

**Warning:** Use extreme caution when operating the motor with the fan cover removed. The Cast Iron Fan is rotating at an extreme velocity.

3. With a 5mm Allen wrench, turn the Adjustment Screw, as shown in Exhibit **E**. As viewed from the Fan end, turning clockwise will narrow the Braking Gap, turning counter-clockwise will expand the Braking Gap. Adjust the screw until the Braking Gap matches the specification listed above for the motor. Turn on the Motor to verify proper operation. Remove from power and re-adjust if necessary.



Adjusting the braking gap with the fan cover removed.

**Caution:** Never leave the Motor turned on if the Motor Shaft will not turn, or you can hear the Brake rubbing. Damage can occur to the motor if the Brake is not adjusted properly and the Friction Pad is in contact with the Fan.

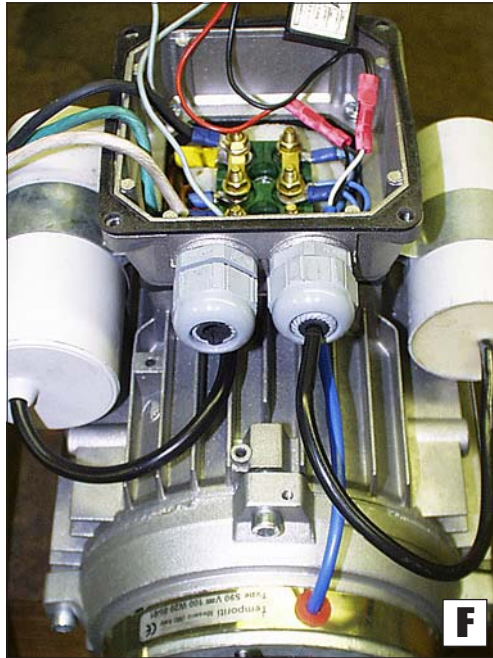
4. A quicker, but more approximate, adjustment can be made through the Fan Cover, as shown in Exhibit **C**. First turn the Adjustment Screw clockwise, with a 5mm Allen wrench, and tighten the Braking Gap as far as it will go until it bottoms out. Then, back off the Adjustment Screw counter-clockwise 1/4 to 3/8<sup>th</sup> turn. Turn on the Motor to verify proper operation. Refer to the Troubleshooting section for corrective action if experiencing problems.

**Caution:** *Continual turning of the Adjustment Screw counter-clockwise can result in the Adjustment Screw and Self-Locking Nut coming out of the Motor Shaft.*

## Section 3

# Motor / Brake Wiring

The electrical components of the motor consist of two Capacitors (single-phase only), the Electromagnet, a Brake Voltage Rectifier (if the motor includes a brake) and Connector Block . As shown in Illustration **F**, wiring cables from each component are routed into the Motor's Wiring Box for connection to the Connection Block.



*Motor electrical components on a single-phase motor.*

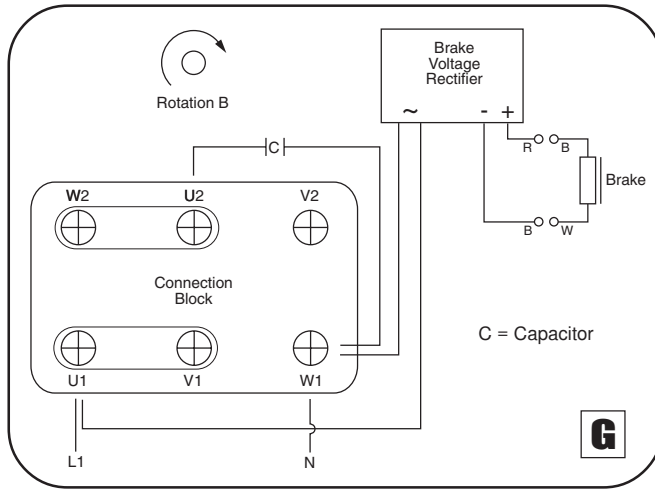
The motor wiring will depend on two factors: (1) whether the machine is single-phase or three-phase, and (2) whether the motor is single-rotation or has a reversing-rotation function. In all examples, pay close attention to the proper jumper configuration for each block diagram.

**Warning:** *Performing any work on the motor wiring should only be done by a qualified electrician.*

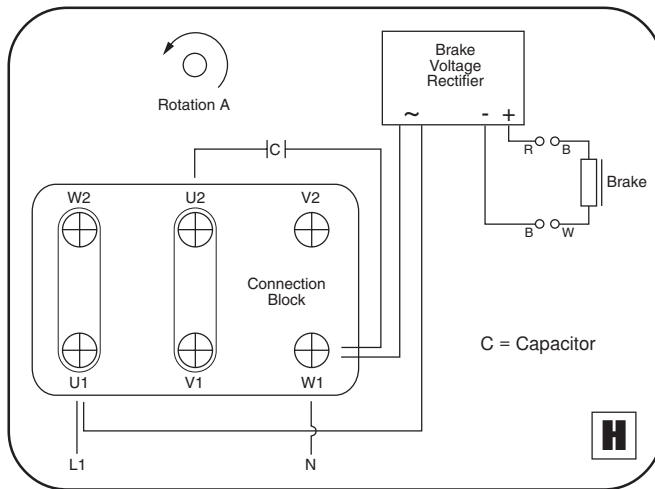
## Motor Connection Block

### Single-Phase / Single-Rotation

The table saw will always be a single-rotation motor. For single-phase machines, the table saw motor will be wired according to Illustration **G** for proper blade rotation. The cutterhead on a jointer/planer rotates in the opposite direction as the table saw and Illustration **H** shows this wiring block.



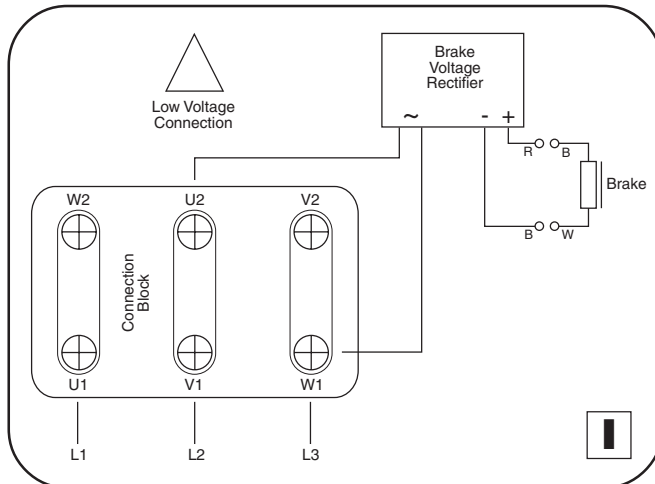
Motor wiring block diagram for single-phase motor with clockwise rotation. Typical for table saw motor.



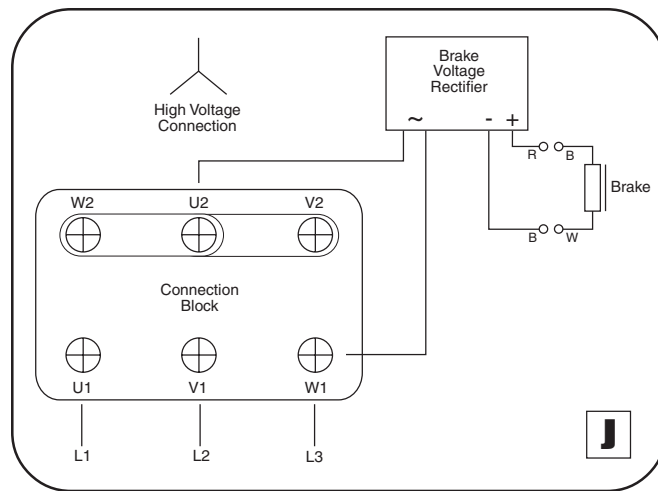
Motor wiring block diagram for single-phase motor with counter-clockwise rotation.

### Three-Phase / Single-Rotation

Illustration I depicts the proper wiring for a three-phase machine connected to a 230 volt supply (see Illustration J for connection to a 460 volt supply).



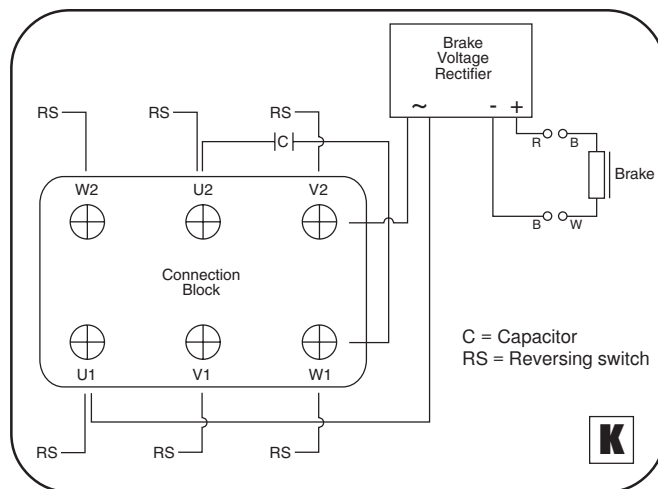
Motor wiring block diagram for a three-phase motor operating at 230 volts.



Motor wiring block diagram for a three-phase motor operating at 460 volts.

### Single-Phase / Reversing-Rotation

The shaper and the jointer/planer will, in most cases, have a reversing switch. The jointer/planer reversing switch is installed to add functionality for the Mortising Attachment. For single-phase machines, these motors will be wired according to Illustration **K**.



Motor wiring block diagram for a single-phase motor connected to a reversing switch. When replacing motor, ensure that the reversing switch leads are re-connected to the same terminals as before.

## Removing The Brake

Although the following describes how to completely remove the brake from the motor, these instructions can also be used to remove damaged or worn out parts for repair or replacement.

It is important to note that the Cast Iron Fan must be re-installed according to the following directions for the safe and proper operation of the motor.

**Warning:** *Failure to turn off the machine and disconnect it from the power source before performing any work on the motor may result in serious injury.*

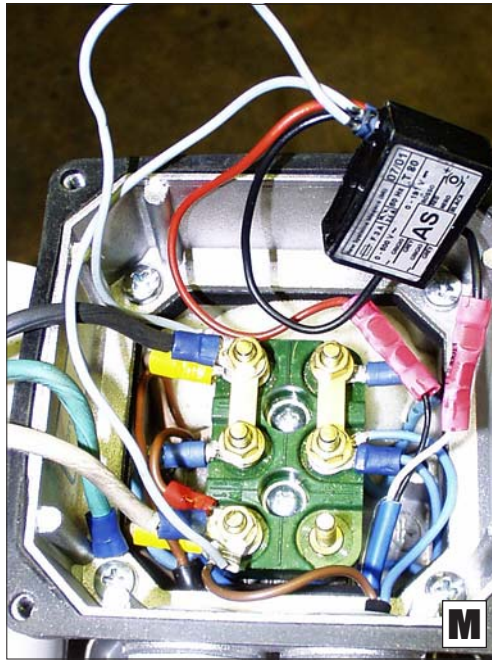
Steps:

1. Disconnect machine from electrical power.
2. Remove Fan Cover from end of motor, as shown in Illustration **E**.
3. Remove motor's wiring box cover for access to the Connector Block.
4. Cut wires leading from the Electromagnet (shown in Illustration **L** in the blue jacket) to the Brake Voltage Rectifier in the electrical box (small black box). Shown in Illustration **M**, these wires are spliced together at the red splice connectors. Cut the wires just below the splice connectors and pull cut wires out of electrical box to free the Electromagnet for later removal.



*Electromagnet wire cable routed to the wiring block.*

5. Disconnect the two wires leading from the Brake Voltage Rectifier, at the Connector block, as shown in Illustration **M**, and remove Brake Voltage Rectifier from motor. Be sure to reconnect other wires and jumpers in their original position.



*Wiring block showing typical connections for a single-rotation motor with brake wiring.*

6. Re-install motor's electrical box cover.
7. With a 5mm Allen wrench, continue to turn the Adjustment Screw counter-clockwise until the Cast Iron Fan, Self-Locking Nut and Spring are removed from the motor.
8. With a 5mm Allen wrench, unscrew the Electromagnet Mounting Posts from the Motor End Frame until the Electromagnet and Mobile Anchor are removed.
9. Re-install the Cast Iron Fan by first ensuring that the Fan Spring and the Key are in place on the Motor Shaft. Tighten securely.



# Troubleshooting

**Warning:** Failure to turn off the machine and disconnect it from the power source before performing any work on the motor may result in serious injury.

## PROBLEM

*“When I turn on the machine I hear a ‘humming’ sound but, nothing happens. The saw blade (cutterhead or spindle) is not turning.”*

### POSSIBLE CAUSE:

This typically is an indication that the motor brake is not releasing. Below are the steps to resolve this problem, starting with the most likely cause (and easiest to resolve) and working down to isolate the solution:

1. The Friction Pad is simply stuck to the Fan. The Friction Pad is a soft “carbon-type” material that can develop a surface adhesion to the Fan when the machine has not been used for some time. Refer to Section 2 - Brake Adjustment/Normal Operation for a better understanding. Here are a couple of methods for breaking the Friction Pad loose, depending on the type of machine:

Saw motor (or other machine without a brake release, or reversing switch) - With the machine unplugged from the electrical source, a simple solution is to place a set of channel locks, or similar wrench, on the motor drive shaft between the motor housing and the pulley and give the motor shaft a quick turn. This should be sufficient to break the Friction Pad loose. Use caution not to damage key components on the motor shaft. Plug in machine and turn on to verify operation.

Shaper/Planer/Jointer - Turn motor selection switch to the “neutral” or “brake release” position. When the green power button is pressed, a click and humming sound indicates that the Motor Brake has disengaged while the motor power to the cutterhead (or spindle) remains off. The same method used above for the saw motor can be used here, or an alternative method would be to use an Allen wrench in either the spindle or in the mortising chuck, a quick turn of the shaft can break the Friction Pad loose allowing the cutterhead (or spindle) to spin freely.

2. The Braking Gap is not properly set. If, after attempting to free a stuck Friction Pad, the Brake still will not release, then it is probable that the Braking Gap is not properly set and the Electromagnet is not able to pull the Mobile Anchor off of the Fan. This can be the result of the Braking Gap being so close that there is not room for the Mobile Anchor to separate from the Fan, resulting in an “always engaged” brake. Or, the Braking Gap is too large and the Electromagnet is not able to pull in the Mobile Anchor. This can be the result of a low supply voltage or the normal wearing down of the Friction Pad. In either case, refer to “How to Adjust the Braking Gap” in Section 2 - Brake Adjustment/Normal Operation for steps in how to check and correct this situation.

3. The Voltage Rectifier has failed. A remote possibility for a Brake release problem is the failure of the Voltage Rectifier. This cuts off all DC power to the Electromagnet. Testing and replacement of the Voltage Rectifier should only be done by a qualified electrician.

## PROBLEM

*“When I turn on the machine, the saw blade (cutterhead or spindle) turns slowly, or with some difficulty. I can hear something rubbing in the motor.”*

### POSSIBLE CAUSE:

This typically is an indication that the motor brake has only partially disengaged and is still rubbing against the Fan. There are two possible reasons for this problem:

1. The Braking Gap is not properly set. It is probable that the Braking Gap is not properly set and the Electromagnet is not able to pull the Mobile Anchor off of the Fan. This can be the result of the Braking Gap being so close that there is not room for the Mobile Anchor to separate from the Fan, resulting in a “partially engaged” brake. Or, the Braking Gap is too large and the Electromagnet is not able to completely pull in the Mobile Anchor. This can be the result of a low supply voltage or the normal wearing down of the Friction Pad. In either case, refer to “How to Adjust the Braking Gap” in Section 2 - Brake Adjustment/Normal Operation for steps in how to check and correct this situation.
3. The Brake Voltage Rectifier has failed. A remote possibility for a Brake release problem is the failure of the Voltage Rectifier. This cuts off all DC power to the Electromagnet. Testing and replacement of the Voltage Rectifier should only be done by a qualified electrician.

**Warning:** *Performing any work on the motor wiring should only be done by a qualified electrician.*

## PROBLEM:

*“While running the machine, the Overload Protection Switch frequently trips turning the machine off.”*

### POSSIBLE CAUSE:

There can be several reasons for the Overload Switch to kick-off the power. Below are the steps to resolve this problem, starting with the most likely cause and working down to isolate the solution:

1. The Overload Protection Switch current drop-out setting is too low. Inside the switch housing there is a potentiometer adjustment on the Overload Protection Switch that sets the level of current that the switch will drop out. Remove the cover on the Switch housing and increase the current setting on this potentiometer.
2. The supply voltage is below the rated operating voltage of the machine. The electrical system is designed for 230V operation - this determines the motor’s maximum rated Current draw, and the Overload Protection Switch is selected to closely match this maximum rating. As the supply voltage decreases, the current drawn by the motor

increases (Ohm's law) causing it to exceed the maximum drop-out current setting of the Overload Protection Switch.

- A. To compensate for the increased current drawn by the motor, the standard Overload Protection Switch can be replaced with one that has a higher drop-out current setting. In most cases, this is not the ideal solution because the motor will continue to run at an elevated current requirement thus causing the motor to run at a hotter temperature.
  - B. To correct for the low supply voltage, it is recommended that a transformer be incorporated into the system to boost the voltage to the machine.
3. The blade (knives or cutters) are dull, need replacing. When your cutting edges become dull they increase the load placed on the motor. Since the Overload Protection Switch setting may be closely matched to the motor's rating, this extra load may cause the Switch to trip.
  2. The Motor is exceeding the maximum rated Current draw. This can be caused by failures in the motor, such as in the bearings or the motor windings. Or, this can be caused by the motor's brake not working properly and putting the motor under an extra load.
    - A. First, verify that the motor's brake is not engaged or hindering the motor's operation. Refer to Section 2 - Brake Adjustment/Normal Operation, and to the first two problems in Section 4 - Troubleshooting, for steps in how to check and correct this situation.
    - B. If the brake appears to be operating correctly, determine if another malfunction exists. Usually, there are uncharacteristic noises and/or vibrations when a bearing has failed. A failed motor winding will result in the motor running at higher temperatures.
  3. The Motor is operating within normal specifications. In this case, the likely cause of the problem is within the switch itself. Open up the switch cover and verify that the Overload Protection Switch is set to the proper Current setting. Call for service instructions.

## PROBLEM:

*"The motor is running hot and seems to be severely overheating."*

## POSSIBLE CAUSE:

As with the previous problem of a constantly tripping Overload Protection Switch, there can be several reasons for the motor overheating. However, all of the causes result in the motor pulling more current than it was designed to draw. Of concern in this situation, is the fact that the Overload Protection Switch has not kicked-off the machine.

1. First, determine why the Overload Protection Switch has not tripped. This could be from a faulty switch, or a mis-adjusted setting.
2. The steps to locating the cause of the overheating and resolving the problem are the same as with the previous problem. Refer to the steps in resolving the tripping Overload Protection Switch.



## Section 5

# Service & Support

Tech Mark provides a variety of resources to assist in troubleshooting and correcting any problems you may encounter.

### Support Resources

#### Email support

[info@tech-mark.com](mailto:info@tech-mark.com)

- Can't resolve the problem using the Technical Guide? Send an email to our support staff and expect a response within 24 business hours (weekends and holidays excluded).

#### Phone Support

(501) 945-9393

- If your problem requires phone assistance, please call us to speak directly with a Tech Mark technician. Technicians are available Monday through Friday, 8 a.m. to 5 p.m. CST.



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## Rojek Woodworking Machinery Limited Warranty and Return Policy

### One-Year Limited Warranty (U.S. Only)

Tech Mark, Inc. ("TMI"), as the exclusive importer and agent, warrants that Rojek Woodworking Machinery Company ("Rojek") manufactures its products to meet high quality and durability standards in accordance with industry-standard practices. TMI fully supports Rojek's warranty that the products it manufactures, and TMI sells, will be free from defects in materials and workmanship. The limited warranty term is one year beginning on the date of invoice, as described in the following text.

Damage due to shipping the products to you is not covered under this limited warranty. Shipping damage is covered by shipping insurance and is therefore dependent on you thoroughly examining shipping containers for any sign of abuse or damage, and noting exceptions on shipping documents, before signing for, and releasing shipper.

Otherwise, this limited warranty does not cover any asserted defect which has resulted from normal wear or due to external causes, including accident, abuse, misuse, problems with electrical power, servicing or alteration not authorized by TMI, usage not in accordance with product instructions, failure to perform required preventive maintenance, and problems caused by use of parts and components not supplied by Rojek, or its agent TMI.

### Examination and Repair

You must make a decision to accept the product or identify defects at once, check the product now. Our 30-day satisfaction guarantee on machinery is for examination only. **We are not able to accept machines placed into service unless we have confirmed that it is defective and beyond reasonable repair.** Returns during this period will be subject to a 25% restocking fee (a portion of which is to pay for return shipping). Any refund, or credit, is subject to satisfactory return and inspection of machinery which includes, but is not limited to, receipt of machinery in a "like new" re-sellable condition. To return machinery you must first obtain a Return Authorization Number (RA #). TMI will issue a "call ticket" for shipper to pick up machine, at TMI's expense, at a designated location. Prior to pickup, the machine must be returned to its original crating, or packaging, for safeguarding or you accept risk of loss or damage during shipment.

During the one-year period beginning on the invoice date, TMI will repair or replace defective parts covered under this limited warranty that are returned to TMI's facility. To request warranty repairs, you must contact TMI within the warranty period. If a warranty repair is required, TMI will issue a Return Authorization Number (RA #). You must ship the products back to TMI in their original or equivalent packaging, prepay shipping charges, and insure the shipment or accept the risk of loss or damage during shipment. TMI will ship the repaired or replacement products to you freight prepaid if you use an address in the continental U.S., where applicable. Shipments to other locations will be made freight collect.

TMI owns all parts removed from repaired products. TMI uses new and reconditioned parts made by various manufacturers in performing warranty repairs and building replacement products. If TMI repairs or replaces a part, the warranty term is not extended.

### General Provisions

THIS LIMITED WARRANTY GIVES YOU SPECIFIC LEGAL RIGHTS, AND YOU MAY ALSO HAVE OTHER RIGHTS, WHICH VARY FROM STATE TO STATE (OR JURISDICTION TO JURISDICTION). ROJEK'S OR TMI'S RESPONSIBILITY FOR MALFUNCTIONS AND DEFECTS IN MACHINERY IS LIMITED TO REPAIR AND REPLACEMENT OF PARTS AS SET FORTH IN THIS LIMITED WARRANTY STATEMENT. THIS WARRANTY IS ROJEK'S, AND TMI'S, SOLE WARRANTY AND SETS FORTH THE CUSTOMER'S EXCLUSIVE REMEDY, WITH RESPECT TO DEFECTIVE PRODUCTS; ALL OTHER WARRANTIES, EXPRESS AND/OR IMPLIED, WHETHER OF MERCHANTABILITY, FITNESS FOR PURPOSE OR OTHERWISE, ARE EXPRESSLY DISCLAIMED BY ROJEK AND TMI. UNDER NO CIRCUMSTANCES WILL ROJEK, OR TMI, BE LIABLE FOR DEATH, INJURIES TO PERSONS OR PROPERTY, OR FOR INCIDENTAL, CONTINGENT, SPECIAL, OR CONSEQUENTIAL DAMAGES RESULTING FROM THE USE OF OUR PRODUCTS. SOME STATES (OR JURISDICTIONS) DO NOT ALLOW LIMITATIONS ON HOW LONG AN IMPLIED WARRANTY LASTS, SO THE PRECEDING LIMITATION MAY NOT APPLY TO YOU.

ROJEK, OR TMI, DO NOT ACCEPT LIABILITY BEYOND THE REMEDIES SET FORTH IN THIS LIMITED WARRANTY STATEMENT OR LIABILITY FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES, INCLUDING WITHOUT LIMITATION ANY LIABILITY FOR PRODUCTS NOT BEING AVAILABLE FOR USE OR FOR LOST TIME OR MATERIAL. SOME STATES (OR JURISDICTIONS) DO NOT ALLOW THE EXCLUSION OR LIMITATION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES, SO THE PRECEDING EXCLUSION OR LIMITATION MAY NOT APPLY TO YOU.

June 1, 2004





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*Ver #: 0409*

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