



RAS[®] Mill MANUAL

Version 5
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Introduction






Thank you for purchasing Romer Labs RAS® Mill. The RAS® Mill is a versatile and easy to use mill that will meet your sample preparation and sample grinding needs for a variety of analyses, including pesticide and mycotoxin testing procedures.

Romer Labs offers a durable mill that has been specifically designed for products that are difficult to grind due to high moisture content such as pet foods, wet maize, nuts or canola. Some examples are listed in *Table 1*.

Table 1. Evaluated matrices, incl. description and pictures

| Matrix | Description | Picture |
|---------|---|--|
| Alfalfa | Humidity content: 12 % Consistency after grinding: small powdery particles |  A photograph showing two piles of alfalfa on a blue surface. On the left is a pile of long, dry, yellowish-brown stems. On the right is a pile of finely ground, powdery alfalfa particles. |
| Barley | Humidity content: 11 % Consistency after grinding: farinaceous, fine-grained structure |  A photograph showing two piles of barley on a blue surface. On the left is a pile of whole, golden-brown barley grains. On the right is a pile of finely ground, farinaceous barley particles. |
| Canola | Fat content: 45 % Consistency after grinding: non-cohesive, powder like structure |  A photograph showing two piles of canola on a blue surface. On the left is a pile of whole, dark brown/black canola seeds. On the right is a pile of finely ground, bright yellow powder-like canola particles. |
| Corn | Humidity content: 11 % Consistency after grinding: farinaceous, slight granular structure |  A photograph showing two piles of corn on a blue surface. On the left is a pile of whole, yellow-orange corn kernels. On the right is a pile of finely ground, off-white granular corn particles. |

| Matrix | Description | Picture |
|----------------|---|--|
| Feed (pellets) | Humidity content: 12 % Fat content: 2 % Consistency after grinding: farinaceous structure |  |
| Hazelnut | Fat content: 62 % Consistency after grinding: granular, slight fatty, non-cohesive structure |  |
| Oat | Humidity content: 14 % Consistency after grinding: farinaceous structure with husks |  |
| Pet Food | Humidity content: 19 % Fat content: 15 % Consistency after grinding: non-cohesive, powder like structure |  |
| Pistachio | Fat content: 52 % Consistency after grinding: granular, paste-like, cohesive, fatty structure |  |

| | | |
|----------|---|--|
| Rice | <p>Humidity content: 10 %</p> <p>Consistency after grinding: fine-grained, powdery structure</p> |  |
| Rye | <p>Humidity content: 10 %</p> <p>Consistency after grinding: farinaceous, fine-grained structure</p> |  |
| Soy | <p>Humidity content: 10 %</p> <p>Consistency after grinding: farinaceous, slight granular structure</p> |  |
| Wet Corn | <p>Humidity content: 35 %</p> <p>Consistency after grinding: farinaceous, slight granular structure</p> |  |
| Wheat | <p>Humidity content: 10 %</p> <p>Consistency after grinding: farinaceous, fine-grained structure</p> |  |

Safety Information

Safety should always be the first concern when operating the RAS® Mill. The following guidelines have been written for your protection. Always take caution when operating any piece of equipment.

To avoid personal injury:

- Always wear a dust respirator to prevent the inhalation of toxic materials.
- Wear protective eye gear - goggles, safety glasses or other approved eyewear.
- Use the mill only with a grounded 3-prong plug (otherwise damage to the unit may occur).
- Make sure the mill is on a level surface.
- Use in a well ventilated area, such as a fume hood, etc.
- Replace fuses as outlined in the specifications section of this manual.

DO NOT:

- Operate the mill with any part removed (lid, safety switches, chutes electrical covers, etc.).
- Plug in the unit while the power switch is in the "on" position.
- Use the mill for any purpose other than which is stated in this manual.
- Disassemble or otherwise attempt to service this unit unless the power cord is disconnected.
- Attempt to remove the back cover of the control panel, as electric shock may occur. Any attempt to open this panel will void all warranties.
- Attempt to adjust or otherwise service control panel on the bottom of the mill. Any attempt to open this panel will void all warranties.

Safety Precautions

1.1 Signal words in safety precautions



DANGER!

The safety note with the **DANGER!** signal indicates the **risk of personal danger** and high material damage in case of failure to observe the instructions.



WARNING!

The safety instruction **WARNING!** points out a danger which could cause **personal injury**.



CAUTION!

The safety instruction **CAUTION!** indicates a danger which can result in **property damage**.

1.2 Symbols in safety precautions



WARNING!

This safety note points out possible **risks of damage by forklift trucks**.



WARNING!

The used symbol indicates a **general hazard**.



WARNING!

This safety note indicates **danger of crushing**.



CAUTION!

This safety note indicates **danger due to hot surfaces (risk of burns)**.



WARNING!

This safety note indicates **danger of slipping**.



WARNING!

This safety note indicates **danger of tripping**.



WARNING!

This safety note indicates a **risk due to falling objects**.



DANGER! This safety note indicates **danger of electric voltage**.



WARNING! This safety note indicates a **risk** when working with **long loose hair and loose clothing**.



CAUTION! This note indicates that safety shoes have to be worn.



CAUTION! This note indicates a recommendation to wear protective gloves.



CAUTION! This note indicates that a respiratory mask has to be worn.



CAUTION! This note indicates that protective eyewear has to be worn.



CAUTION! This note indicates that the instruction manual has to be read.

1.3 Safety precautions



WARNING!

Pay attention to the potential risk of crushing during transport of the RAS® Mill with a forklift truck: between the forks and the pallet during lifting; between pallet and floor when putting down; between the RAS® Mill and stationary facilities.















WARNING!

For the transportation with a forklift truck the RAS® Mill has to be lifted simultaneously on both sides (so that the RAS® Mill cannot tip over and endanger people).



WARNING!

The RAS® Mill always has to be raised by 2 people if raised manually (weight of RAS® Mill = 63 kg). A RAS® Mill has always to be placed on an adequate laboratory bench (carrying capacity). Possible risk of crushing when putting down!

| | | |
|---|-----------------|--|
|  | WARNING! | The hopper has to be secured properly on top of the housing and the safety switch power cord has to be connected to the receptacle on the hopper – otherwise it is prohibited to use the RAS® Mill! Removing the hopper may only be performed using proper tools (EN 953). Use of slotted or wing screws is prohibited. Possible risk of crushing! |
|  | CAUTION! | It is forbidden to touch the motor when the mill is in operation. Before doing maintenance work allow the motor to cool down. |
|  | CAUTION! | Do not touch the edge of the hopper. Don't let fall the lid of the hopper – risk of crushing. |
|  | CAUTION! | Allow the burr sets to cool down prior to removal – they can run hot during grinding procedure – risk of burns. |
|  | CAUTION! | Be cautious that during maintenance work no parts (burr sets, feed worm, etc.) fall to the ground – risk of crushing. |
|  | CAUTION! | Be aware of the potential risk of crushing between grinder housing and stir bar when no hopper is secured on the housing. |
|  | CAUTION! | While screwing tight the grinder cap assembly, do not reach into the slot between the grinder cap and the allen screw. |
|  | CAUTION! | If the laboratory mill had been disassembled, all parts have to be reassembled again prior to putting into operation. |
|  | WARNING! | Daily check screws, bolts, clamps, etc. for fatigue of material or breakage – if necessary change immediately. |
|  | WARNING! | Immediately remove objects left lying around – source of slipping and stumbling. |
|  | CAUTION! | Dispose packaging material according to the environmental regulations (material separation). |
|  | CAUTION! | Cereal grains have to be removed immediately from the floor – risk of slipping. |



CAUTION!

Ensure sufficient stability of the laboratory mill (leveled, non-slippery ground; be aware of vibrations due to the grinding procedure).



WARNING!

When working near or with the laboratory mill it is forbidden to wear long hair in loose or wear loose clothes – long hair has to be put up.

1.4 Personal protective equipment



During maintenance and cleaning work safety shoes and protective gloves are mandatory.



People working with the laboratory mill are obliged to wear respiratory gloves and protective glasses.

Assembly

The whole assembly procedure is shown in the RAS® Mill training video available on www.romerlabs.com or on Romer Labs YouTube channel.

Carefully unpack the RAS® Mill and inspect for any damage. If the mill is damaged, contact your Romer Labs representative immediately.

The RAS® Mill is shipped in two pieces: the frame, including the motor and the collection chute, and the grinding hopper.

DO NOT CONNECT POWER TO THE RAS® MILL UNTIL IT IS COMPLETELY ASSEMBLED!

Tools required for assembly:

- 5/8" allen wrench (included)
- 3/8" allen wrench
- 3/8" open-end wrench

Place the mill on a solid, flat surface. If necessary, adjust the feet to level the mill. Attach the hopper by removing the screws from the sides of the grinder housing and placing the hopper on top of the housing with the Romer Labs label and flat surface facing towards you. Secure the screws tightly. This will prevent the screws or nuts from entering the grinder housing and possibly causing damage to the mill. The screws should be inserted through the inside of the hopper and the nuts attached on the outside of the hopper.

Connect the safety switch power cord to the receptacle on the hopper (*Figure 1*). The safety cord must be in place in order for the mill to operate. Any attempt to bypass, modify or otherwise improperly use this safety mechanism will void the warranty for the RAS® Mill.



Figure 1. Connection of the safety switch power cord

Check the finally adjusted RAS® Mill (*Figure 2*). The RAS® Mill can now be connected to power and is ready for use.



Figure 2. Finally adjusted RAS® Mill

Operation and Grinding Procedure

The operating and grinding procedure is shown in the RAS® Mill training video available on www.romerlabs.com or on Romer Labs YouTube channel.

1. Visually inspect sample for any rocks, metal objects or other foreign material, which may damage the mill.
2. Choose the collection chute for approximate subsample to be obtained.
3. Set grind adjust cap for desired sample particle size (see grinder knob and speed adjustments section).
4. Set variable speed control to desired setting. Speed control may be adjusted during grinding operation to achieve a finer grind, depending on commodity.
5. Fill hopper with sample and close lid. For safety reasons, the mill will not operate with the lid in the open position.
6. Turn power switch to the "on" position.
7. After the sample is ground, turn power switch to the "off" position before lifting the mill lid. DO NOT use the lid to start and stop the grinder. This may cause damage to the motor speed control.
8. Clean the mill thoroughly after each use (see maintenance, cleaning and care section).

Grinder Knob and Speed Adjustments

Grinder knob adjustment is shown in the RAS® Mill training video available on www.romerlabs.com or on Romer Labs YouTube channel.

The grinder cap can be adjusted to give different particle sizes. 10 different coarseness settings can be chosen by turning the grinder knob clockwise. To obtain a coarse result (larger particle size) put the grinder knob to position 1 on the left. For a smaller particle size turn the grinder knob clockwise (*Figure 3*).

Additionally the variable speed control can be adjusted to achieve a finer grind depending on commodity.

However different commodities will grind to different particle sizes when using the same setting. Recommended settings are listed in *Table 2* (common matrices) and *Table 3* (difficult matrices).

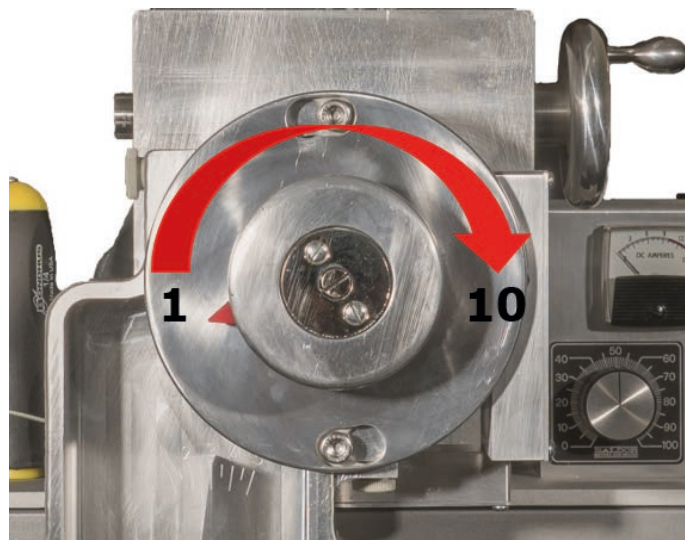


Figure 3. Grinder Knob with different settings

Table 2. Recommended settings for common matrices, 1 kg can be ground in approx. 1 min.

| Matrix | Coarseness Setting | Speed [amp] |
|----------------|---------------------------|--------------------|
| Barley | 4 – 6 | 70 |
| Corn | 9 | 80 |
| Feed (Pellets) | 7 | 100 |
| Rice | 10 | 100 |
| Rye | 6 – 7 | 80 – 85 |
| Soy | 5 – 7 | 80 |
| Wheat | 6 | 70 – 80 |

Table 3. Recommended settings for difficult matrices, time for grinding of 1 kg may vary

| Matrix | Coarseness Setting | Speed [amp] |
|---------------|---------------------------|--------------------|
| Alfalfa | 10 | 100 |
| Canola | 7 | 80 |
| Hazelnut | 5 | 50 |
| Oat | 4 | 50 |
| Pet Food | 1 | 30 |
| Pistachio | 5 | 50 |
| Wet Corn | 3-6 | 60-80 |

Maintenance, Cleaning and Care

Cleaning and care procedures are shown in the RAS® Mill training video available on www.romerlabs.com or on Romer Labs YouTube channel.

A small amount of ground sample may remain in the mill after the total sample has been ground and collected. To prevent cross-contamination follow the below mentioned cleaning procedure (power switch on the "off" position):

1. After the sample is completely ground cover the chute openings with an attachment of an operating vacuum cleaner. Vacuum for approximately 30 seconds.
2. Remove the grinder cap and feed worm assembly by loosening the hex-shaped mounting screws on the top and bottom of the grinder cap with the provided allen wrench. Turn the grinder cap clockwise and pull away to remove to entire unit.
3. Take out the grinder cap and feed worm and vacuum clean for 30 seconds. Additionally also vacuum clean the inside of the grinder housing and the hopper to remove any built-up residue.
4. Use a brush to remove remaining residues.
5. Run approximately 100 grams of the next sample through the grinder and discard.



Figure 4. *Disassembled grinder cap and feed worm*

The RAS® Mill has been preset at Romer Labs, Inc., but over time, the burr set (grinding assembly inside the grinder housing) may become worn and may need adjustment. To adjust the burr set, follow the procedure listed below.

1. Turn the power switch to the "off" position.
2. Adjust the grinder knob to the farthest clockwise position (position 10).
3. Loosen but not remove the outside locking screws on the grinder knob.
4. Turn the power switch to the "on" position.
5. Slowly turn the grind adjustment screw clockwise until a faint grinding sound is heard. Then slowly turn the grind adjustment screw counter-clockwise 1/8 of a turn until the burr set no longer makes a grinding noise.
6. After setting the burr set, tighten the locking screws.
7. To achieve a larger particle size, turn the grind adjustment screw counter-clockwise in step 5 and tighten the locking screws.

Cross contamination after cleaning process

No cross contamination of uncontaminated samples with contaminated ones was observed after thorough cleaning following the above mentioned procedure.

Contaminated corn (Deoxynivalenol) was ground followed by a blank rice sample. After grinding 1 kg of contaminated corn sample the mill was cleaned as described above and 250 g of non-contaminated rice were ground. Both samples were then checked with reference analytics for their Deoxynivalenol content (*Table 4*).

Table 4. LC-MS results for cross contamination

| Matrix | Deoxynivalenol [$\mu\text{g}/\text{kg}$] |
|---|--|
| Corn (ground with RAS® mill) | 2988 \pm 359 |
| Rice (unground) | <LOD |
| Rice (ground with RAS® mill after cleaning) | <LOD |

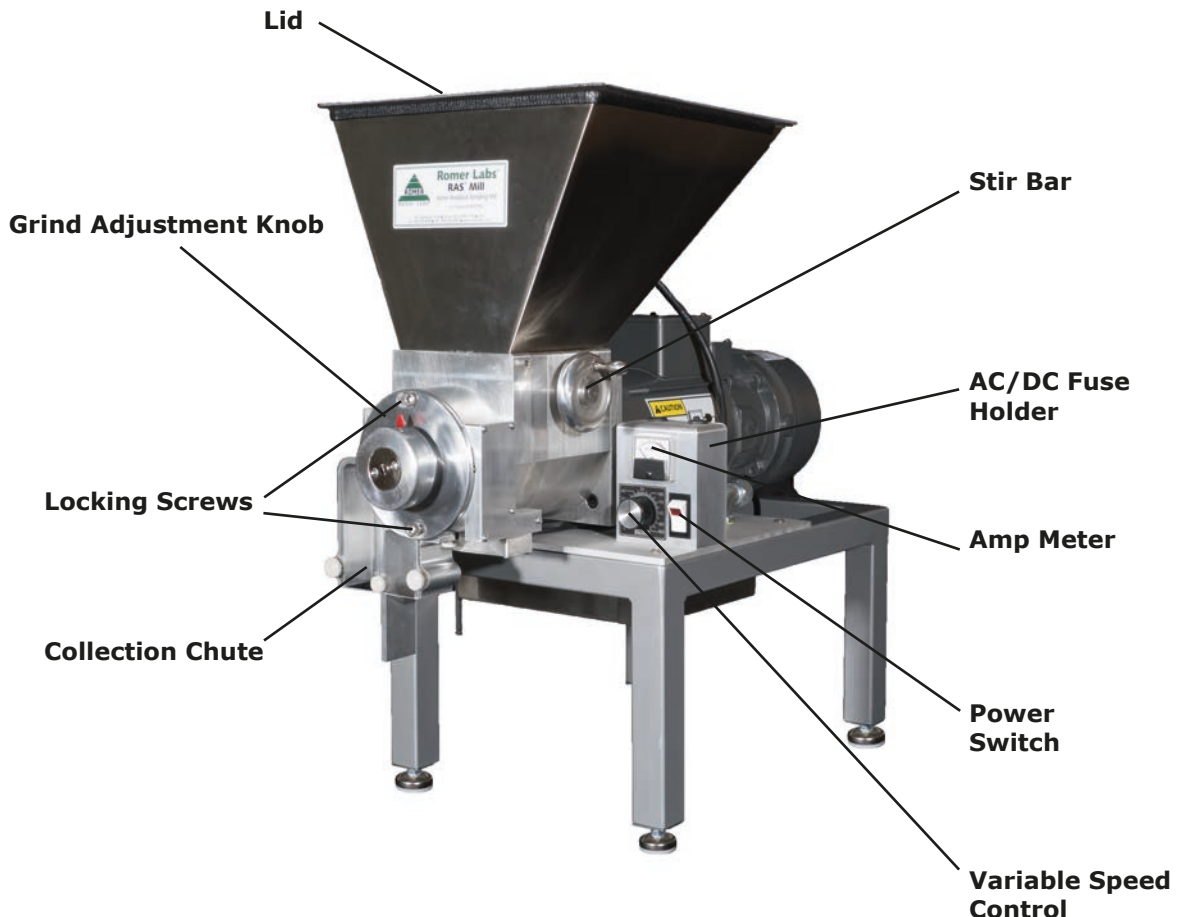
LOD – Limit of Detection: 20 $\mu\text{g}/\text{kg}$

Specifications

| | | | |
|---------------------------|------------------------|-------------------------|------------------------|
| Motor: | 1 HP | Hopper: | Stainless Steel |
| Current: | D.C. | Feedworm: | Flash Chrome |
| Voltage: (AC line) | 115 V or 230 V | Grinder Housing: | Aluminum |
| Voltage: (DC line) | 90-130 V or 180 V | Grinding Burrs: | Cast Alloy |
| Weight: | approx. 139 lb (63 kg) | Fuse: | |
| Shipping Weight: | ~ 152 lb (69 kg) | 115 V | DC 25 amp AC 15 amp |
| Height: | 28.5 in (72.5 cm) | 230 V | DC 8 amp AC 15 amp |
| Width: | 14 in (35.5 cm) | | |
| Depth: | 29 in (74 cm) | | |

The 230 V RAS® Mill has a CE approval.

FEATURES



Sampling Procedures for Mycotoxin Analysis

Proper sampling and sample preparation is the foundation of quality mycotoxin testing. This is the most crucial step in obtaining accurate mycotoxin test results and is very often overlooked. Without a properly obtained and prepared sample, mycotoxin test results will have a high degree of analytical variability.






Please consult your Romer Labs representative for a copy of the Romer Labs' Guide to Mycotoxins, Volume 2 entitled "Sampling and Sample Preparation for Mycotoxin Analysis". This publication outlines the proper procedures for sampling and sample preparation. Additionally a Sampling Quick Guide is available on request.

Technical Service Guide

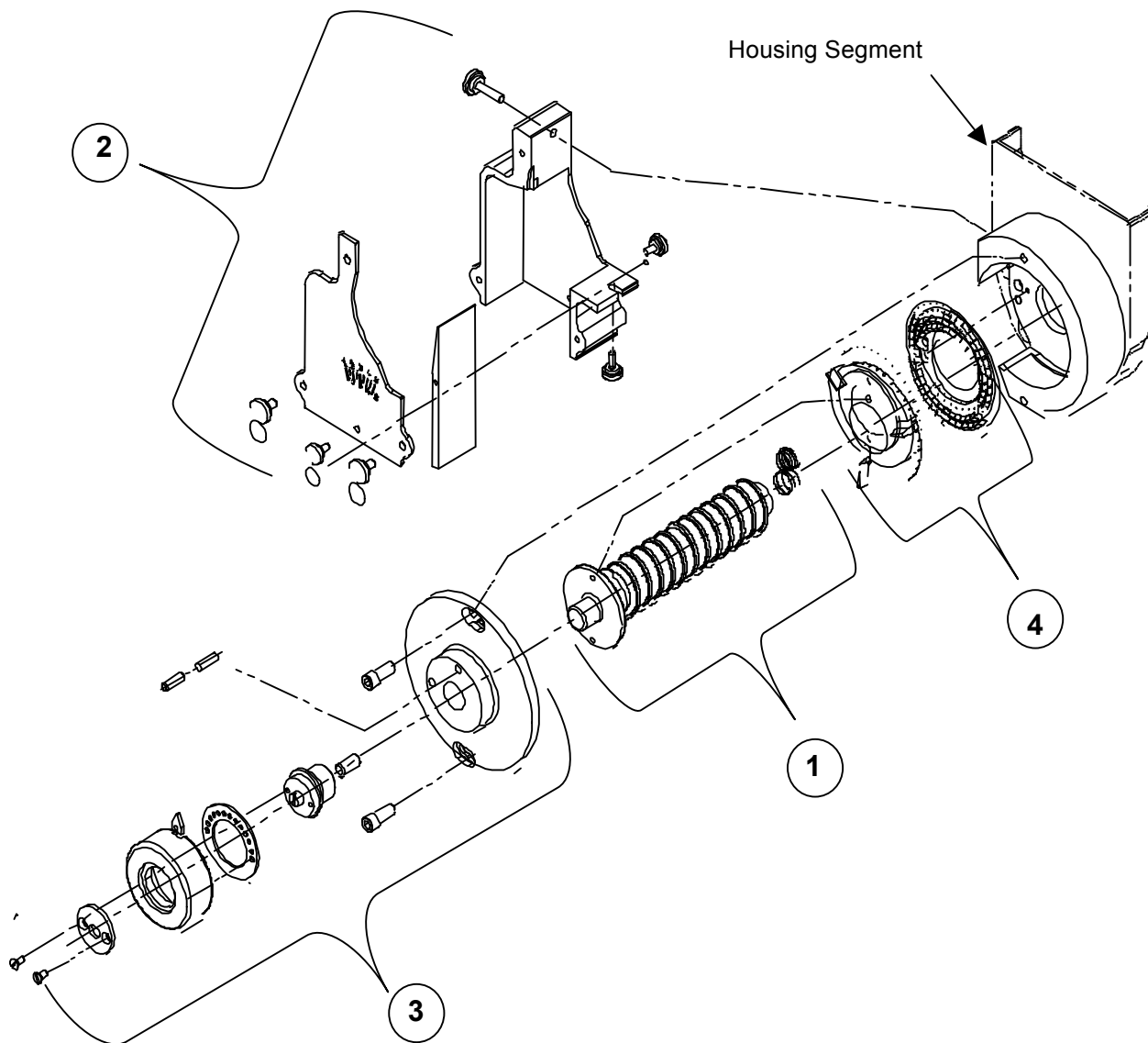
| Problem | Corrective Action |
|--|---|
| Power switch does not light and the mill will not run. | Be sure power cord is plugged in. Check fuses. |
| Power switch is lit, but the mill will not run. | Be sure hopper lid is closed. Be sure collection chute is securely attached. |
| Mill runs but product is not being ground. | Check the chute for blockage. Check the burr set for blockage. Check for obstruction in the hopper or grinder housing. The material may be too large for the mill to grind. Burr set may need to be adjusted for a finer grind. |
| Burr make grinding noise while running with no sample in the mill. | Adjust burr set. The thrust plug may be worn and need replaced. The tension spring may be worn and need replaced. |

If you have questions concerning the mill, please contact your local Romer Labs support.

Replacement Parts

| Part # | Description | Picture | Item number |
|--|--|--|-------------|
| 1 | Feed worm with bushings (burr set not included) |  | 10002462 |
| 2 | RAS® Mill chute (Cover, Deflector Chute, Thumbscrews) |  | 10002461 |
| 3 | Grinder cap assembly kit (Cap, Knob, Plates, Plunger, Spring, Pin, Screw sets) |  | 10002463 |
| 4 | Burr set |  | 10002458 |
| RAS® Mill "V" chute (for subsampling) | |  | 10002472 |
| Tension springs (pkg. of 3) | | | 10002508 |

Exploded diagram of the grinding assembly in the RAS® Mill.



Warranty

The RAS® Mill is guaranteed by Romer Labs, Inc. to be free of defects in workmanship and materials under normal use for a period of one (1) year from the date of purchase by the consumer. Romer Labs, Inc. designates the right to determine a products warranty status.

All liability of Romer Labs, Inc. is limited to the repair or replacement of the mill. Under no circumstances is Romer Labs, Inc. liable for consequential damage or loss. Instruments and accessories subjected to misuse, abuse, neglect, modification or unauthorized repair constitute exclusion from warranty.

All warranty claims must be directed to your local Romer Labs support.

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Routine Maintenance/Cleaning Log for the RAS® Mill

| Date | Initials | Cleaning Method | Comments | Maintenance Done |
|------|----------|-----------------|----------|------------------|
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