Rota-Rack
Rotary Parts Accumulator

OPERATIONS MANUAL
BETRIEBSANLEITUNG
MANUEL D’INSTALLATION ET DE SERVICE
ISTRUZONI PER L’USO

English

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1. Introduction

Thank you for your purchase of the patent-pending Rota-Rack™. This lean, cost-effective device is designed to safely collect finished parts produced by CNC lathes, screw machines, Swiss-style machines, saws, etc. - providing true lights-out production and increased profits.

The Rota-Rack™ functions by indexing each time a finished part is ejected from the machine, enabling extended periods of unmanned operation and preventing the parts from colliding with force and damaging each other. The unique rotary spiral safely conveys finished parts to the center of the turntable, where they can then be manually removed after a suitable number have been collected.

Setup and operation of the Rota-Rack™ is quite straightforward. To ensure safety and optimum performance, be sure to read through this manual carefully and follow all instructions. Please pay special attention to all safety precautions. All operators of machine tools equipped with the Rota-Rack™ and all maintenance personnel should read this manual and understand the information contained herein.

2. Safety Precautions

The following safety precautions have been prepared to guide and properly instruct operators and maintenance personnel involved with the installation, operation and maintenance of this device. Be sure to read carefully, follow the safety guidelines, and employ safe shop practices when installing, operating, or maintaining the Rota-Rack™.

2.1. Danger

- The Rota-Rack™ operates on standard single-phase electrical power. Contact with any electrical components, terminals, plugs, etc. could cause serious electric shock or even death.

- Never touch any control buttons (start/stop switches, emergency stop, timer, etc.) with wet hands, shoes, or clothes. Doing so could result in serious electric shock or even death.

- The Rota-Rack™ contains moving components (i.e. turntable, conveyor, gear train, etc.) Do not come into contact with these moving components with any part of your body or clothing.

2.2. Warning

- Before any maintenance work is performed, turn off the Rota-Rack™, disconnect from power supply, and follow your company’s lockout / tag-out procedures.

- All electrical work should be performed by a licensed electrician. Do not modify, remove, or adjust any of the Rota-Rack’s™ electrical components.

- Replacement fuses should be of exactly the same specifications as those indicated in the electrical diagram (Appendix A).

- The location and function of the emergency stop button should be known and understood by all operators so it can be actuated immediately if needed.

- Before operating any controls (on/off switches, timers, etc.), be sure to understand their function.

- In case of electrical power failure, actuate emergency stop switch and unplug power cord.

- The maximum workpiece weight capacity of the Rota-Rack™ is 700 lbs., and should be evenly distributed. Do not exceed this limit.
• The Rota-Rack™ has a high center of gravity. When moving or lifting, use a forklift and exercise great care. The position of the forks should always be under the spiral support bar as shown.

  Caution - never move unit when it is loaded, and never lift the Rota-Rack™ by its legs.

• Do not add wheels or casters to the Rota-Rack™.

• Do not use any extension legs other than those supplied with the Rota-Rack™. If you require a height greater than 44”, please contact an applications engineer.

• Avoid getting water, dust, and dirt inside the control box. Keep control box closed during operation.

• Do not remove any warning or identifying plates, labels, etc. from the Rota-Rack™ unit.

• Read all warning plates and labels carefully before operating Rota-Rack™.

If you do not understand these safety precautions or have any questions regarding the safe installation, operation, or maintenance of the Rota-Rack™, please contact an applications engineer.

3. Installation

IMPORTANT – Read through this entire section on Installation before making any modifications to your machine tool.

The Rota-Rack™ should be positioned to effectively collect finished parts as they are ejected from the machine tool. Normally, this is below the machine’s part collection box, or, if the machine is already equipped with a conveyor, at the end of this conveyor.

The universal design of the Rota-Rack™ enables the unit to rotate both clockwise and counterclockwise, and be positioned either to the left or right side of the machine tool.

When choosing the location/orientation of the Rota-Rack™, be sure to consider interference with the machine, operator, chip conveyor, bar feeder, aisle, etc. Please note that it is often necessary to modify the machine's part collection box prior to final positioning.
3.1. Installing the Legs

3.1.1. Verify Leg Length

As long as the required height of the Rota-Rack™ was supplied to Royal Products at the time of order, the unit should arrive with the legs pre-cut to size. Prior to installation of the leveling pads, it is recommended that you verify that the leg length is correct.

In order to determine if your legs are correctly sized, please refer to the following drawings and formulas:

Applications without Rota-Rack™ Conveyor

![Diagram of Applications without Rota-Rack™ Conveyor]

- LENGTH OF LEG BLANK = X - 5.86 (148.8mm)

Applications with Rota-Rack™ Conveyor

![Diagram of Applications with Rota-Rack™ Conveyor]

- LENGTH OF LEG BLANK = X - 9.36 (237.7mm)

- The leg “blank” refers to the overall length of the leg, before the threaded bushings and leveling pad have been installed.

- If you find that your legs are too long, you can shorten them according to the formulas above.

  **Important** – be sure to cut the end that is opposite the tapped holes.

- If the legs appear to be too short for your application, please contact an applications engineer

  **Note** - the leveling pads offer an adjustment range of +/- .50”
3.1.2. Install Leveling Pads

Once it has been verified that the leg length is correct for your application, install the threaded bushings and leveling feet on each leg as outlined in the following steps:

**Step 1**
Using a dead-blow hammer, tap a threaded bushing into each leg.

**Important** – be sure to install on the side of the leg opposite the mounting holes.

**Step 2**
Make sure flange on bushing seats squarely against end of leg.

**Step 3**
Screw in leveling pad and tighten lock nut securely.

**Warning** – length of exposed thread on leveling pad should be no greater than ½”.

3.1.3. Install Legs

**Warning** – due to the top-heavy nature of the Rota-Rack™, use extreme caution when installing legs. Before installing legs, raise Rota-Rack™ of the ground to an appropriate height using a forklift. The position of the forks should always be under the spiral support bar.

**Step 1**
Once a forklift has raised the unit, locate the square recesses on the underside of the Rota-Rack™ that will accept the legs.

**Step 2**
Slide a leg into recess, being sure to align tapped holes in leg with clearance holes in frame.

**Step 3**
Install socket head cap screw with washer through frame into leg – make finger-tight.

**Step 4**
Install second socket head cap screw with washer through outer housing into leg – make finger-tight.

**Step 5**
Securely tighten all four leg bolts on underside of unit.

**Step 6**
Securely tighten all four leg bolts on outer housing.
3.2. Configuring The Spiral & Liners

Note – we normally try to ship the Rota-Rack™ pre-configured according to customer requirements. If your unit is already correctly configured, skip steps 1-20 below and move on to the section titled *Installing the Conveyor.*

**Step 1**
Loosen the three lower socket-head set screws that fix the spiral support rod to the spiral.

**Step 2**
Remove the three upper button head cap screws that fix the spiral support rods to the spiral support bar.

**Step 3**
Remove the three spiral support rods.

**Step 4**
Remove the socket head cap screw that fixes the end of the spiral to the outer housing. The spiral is now free.

**Step 5**
Remove the four strips of U-shaped UHMW plastic from the top edge of the spiral. Note that they are pre-cut to four different lengths.

**Step 6**
Flip the spiral over, and remove the long continuous strip of U-shaped UHMW plastic from the bottom edge of the spiral.

**Step 7**
After all UHMW strips have been removed, flip the spiral back over to its original position.

**Step 8**
Install the long continuous strip of Unshaped UHMW plastic along the original top edge. This will now become the bottom edge.

**Step 9**
Remove the three acorn nuts that fix the short UHMW liner to the outer housing.
Step 10
Before removing the short UHMW liner from the outer housing, note its location between the spiral support bar and the conveyor opening.

Step 11
Repeat steps 9 and 10 for the long UHMW liner.

Step 12
Flip the long UHMW liner over and reinstall on the housing, beginning at the conveyor opening where the short liner had been previously located.

Step 13
Flip the short liner over and reinstall on the housing, tightening the acorn nuts securely. Note that the new location is now between the conveyor opening and the opposite vertical section of the spiral support bar.

Step 14
Flip the spiral over so that the long continuous strip of UHMW rests against the turntable. Align the hole in the spiral with the vertical section of the spiral support bar.

Step 15
Tighten the socket head cap screw to securely fix the spiral to the outer housing.

Step 16
Reinstall the four U-shaped strips of UHMW plastic along the top edge of the spiral in length order, starting with the shortest piece at the center. Use the support rods as spacers between the strips.

Step 17
After all of the U-shaped UHMW strips have been installed, reattach the support rods to the spiral arm. Tighten socket head cap screws securely.

Step 18
Tighten the lower set screws to securely fix the spiral to the support rods.
3.3. Installing the Conveyor

An optional conveyor is available for use with the Rota-Rack™ if your lathe is not equipped with its own conveyor. The Rota-Rack™ conveyor bolts directly to the Rota-Rack™ - it is not necessary to attach the conveyor to the machine tool.

**Step 1**
Install the conveyor arm onto the frame. The conveyor arm can be mounted for either left-hand or right-hand orientation simply by reversing its position.

**Right-Hand Orientation**
Mount bracket as shown. Securely tighten four socket head cap screws.

**Left-Hand Orientation**
Mount bracket as shown. Securely tighten four socket head cap screws.

**Important** — note the oblong hole on the conveyor arm. This enables slight angular adjustment of the conveyor if necessary.

**Step 2**
Install the conveyor cradle bracket on the conveyor arm with two socket head cap screws. Tighten securely.

**Step 3**
Install the conveyor onto the cradle bracket as shown. Be sure to slide conveyor fully forward to ensure that the bolts are captive within the slots and unit cannot tip. Tighten four acorn nuts securely.

**Step 4**
After the conveyor has been installed on the Rota-Rack™, connect the cable to the input on the control box labeled “Conveyor”.

**Step 19**
Spiral and liners have now been configured for the opposite orientation.

**Step 20**
Locate the toggle switch inside control box and flip to opposite position. This switch controls the turntable direction.
3.4. Parts Catcher Modification

It may be necessary modify the parts catcher collection box to allow the workpieces to drop onto the conveyor and proceed towards the Rota-Rack™. On most machines, this will entail cutting out the bottom and one side of the collection box. See examples below.

Warning - when cutting or modifying sheet metal, be sure to wear appropriate safety equipment and use the correct tools. Note – top cover of parts catcher box removed for clarity.  

Helpful hint – if possible, modifying your parts catcher by adding drainage holes will minimize the amount of coolant that gets dumped onto the Rota-Rack™ conveyor.

If you do not fully understand these installation instructions or have any questions regarding the safe installation, operation, or maintenance of the Rota-Rack, please contact an applications engineer.
4. Operation

The basic idea behind the Rota-Rack™ is that the conveyor should energize and the turntable should rotate to the next position each time a finished part comes off of the CNC lathe. By continuously moving the previous part out of the way of the next part, the risk of damage is greatly reduced.

The Rota-Rack has been designed to be controlled through the included PLC – no machine tool interface is required. The operator simply sets the part cycle time, amount of turntable rotation, and the auto-shutoff counter. Follow the detailed PLC programming instructions on the next page.

Note - For customers wishing to control the Rota-Rack’s™ indexing functions through the machine tool control instead of the PLC, please contact an Applications Engineer to discuss your requirements.
4.1. Programming Procedure

1. **Part Cycle Time.** This function tells the Rota-Rack™ when to rotate. By matching this setting to the part cycle time, every time a part comes off the lathe the Rota-Rack™ turntable will index to the next spot.

   - Press the Cycle Time icon on the PLC.
   - Enter the cycle time of the part in hours / minutes / seconds using the up/down arrows.
   - Press enter.

2. **Amount of Rotation.** This function controls the length of time the turntable rotates for each index cycle. For short parts, we have found that a setting of 4-6 seconds works well. For longer parts, 8-10 seconds may be appropriate. The key is to rotate the turntable enough so that the last part is cleared out of the way before the next part comes off the lathe.

   - Press the Amount of Rotation icon on the PLC.
   - Set the rotation time in seconds using the arrow keys.
   - Press enter.

3. **Auto Shut-Off Counter.** This function will stop the Rota-Rack™ from indexing after a pre-determined number of parts have been collected. Typically, the operator will calculate the number of parts he can make with the amount of bar stock that is loaded, and add a few extra pieces as a factor of safety. For example, in an application where there is enough bar stock loaded to make 100 parts, the operator might set the shut-off counter to 110.

   - Press Auto Shut-Off icon on the PLC.
   - Use the up / down arrow keys to enter the number of parts to be made, plus a factor of safety.
   - Press enter.
4. **Start.** After you have programmed the three-functions, simply press the start button to begin the process.

**Note** – for much of the time when a part is being machined, the turntable and conveyor will sit idle and the Rota-Rack™ may appear not to be running. If the green light on top of the control box is blinking, this indicates that the Rota-Rack has been programmed and is running.

5. **Stop/Pause.** When the “Stop/Pause” icon is pressed, operation halts until the “Start” icon is pressed again. Note that pressing the Stop/Pause icon does not erase the pre-programmed values. These values are retained until the unit is re-programmed.

**Important** – All pre-programmed values are always retained in the Rota-Rack™ control, even if power is interrupted. It is important to check and/or re-program the control for each new job – especially the auto-shutoff counter. If this is not done, the unit could stop indexing prematurely, causing parts to pile up on the conveyor.

If you do not fully understand these installation instructions or have any questions regarding the safe installation, operation, or maintenance of the Rota-Rack, please contact an applications engineer.

5. **Maintenance**

The Rota-Rack™ requires periodic maintenance as follows:

- Periodically clean the turntable, conveyor, and drip pan to prevent chip and coolant buildup. Pay special attention to the area between the drip pan and underside of the belt because sharp chips can cut the belt.

  Note that the cleaning interval will vary based upon such factors as chip configuration, coolant type, etc.

- Inspect all wear items (i.e. belt, guides, table top, spiral, etc.) monthly. Replace worn parts as necessary.
6. Specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Height Adjustment Range</td>
<td>10.5” – 44” from floor</td>
</tr>
<tr>
<td>Max. Individual Workpiece Weight</td>
<td>10 lbs.</td>
</tr>
<tr>
<td>Total Payload Capacity</td>
<td>700 lbs. max. (evenly distributed)</td>
</tr>
<tr>
<td>Workpiece Size Range*</td>
<td>Min: ¼” dia. x 1” long</td>
</tr>
<tr>
<td></td>
<td>Max: 3” dia. x 10” long</td>
</tr>
<tr>
<td>Electrical**</td>
<td>110V, 60 Hz., single phase, or 220V, 50Hz, single phase</td>
</tr>
<tr>
<td>Cycle Time Range</td>
<td>Up to 9 hours, 59 minutes, and 59 seconds</td>
</tr>
<tr>
<td>Turntable Rotation Timer</td>
<td>Up to 59 seconds</td>
</tr>
<tr>
<td>Part Counter</td>
<td>Up to 999 pieces</td>
</tr>
</tbody>
</table>

* For parts that fall outside of this range, please contact an applications engineer.

** If you have any questions about the electrical configuration/requirements of your Rota-Rack™ unit, please contact an applications engineer.