



Rotavator™ Unloader Manual
ACI Services, Inc.
PB-0107 Rev. 1; June 12, 2020

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Rotavator™ Assembly Instructions:

The alignment of the poppets in the loaded, or active, position is crucial to the successful operation of the Rotavator – a single deck rotating deactivator valve. This document outlines the process required to assemble, to properly align, and to install a Rotavator. **Read the complete instructions prior to beginning assembly.**

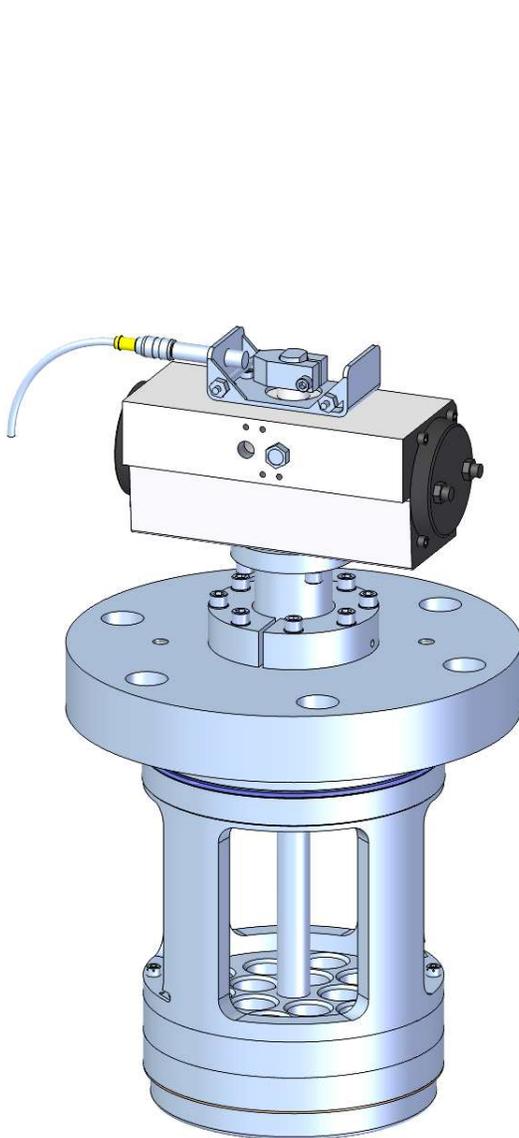


Figure 1: Rotavator

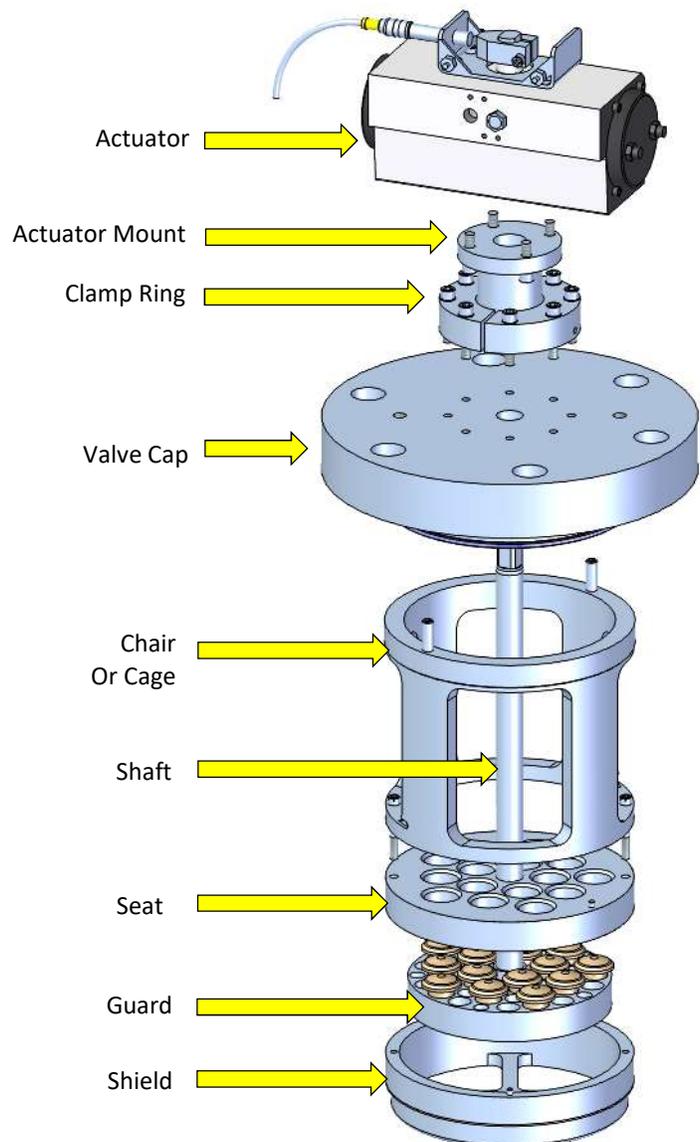
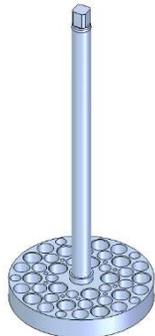
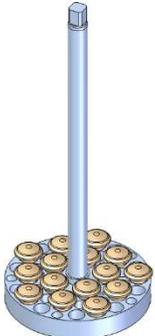
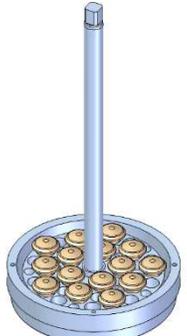
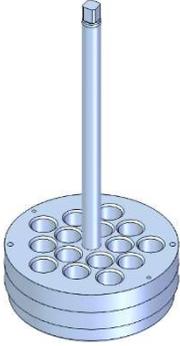
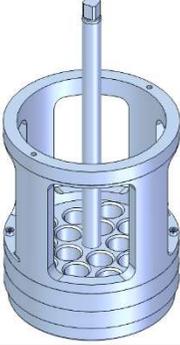


Figure 2: Rotavator Expanded View



GRAPHICS DEPICTED MAY VARY FROM ACTUAL ASSEMBLY. REFER TO THE ASSEMBLY DRAWING AND PARTS LIST FOR ADDITIONAL INFORMATION.

Rotavator General Assembly Instructions:		
No	Description	Related Figure or Reference Document
1	Slide the shaft into the guard, taking care not to mark or gouge any of the machined surfaces on either component.	
2	Place the wear buttons, springs, and then poppets into each cavity of the guard. A small screwdriver or pick may be required to align the wear button.	
3	With the shield sitting on a flat surface, lower the guard and shaft assembly into the shield.	
4	Install the dowel pin(s) into the shield. Install the O-ring(s) into the seat.	

5	Slide the seat over the shaft and onto the shield. The seat should slide onto the dowel pins and meet flush with the shield.	
6	Install the dowel pin(s) into the top of the seat.	
7	<p>Lower the chair down onto the seat dowel pin(s). Install the required bolts and torque as required. DO NOT use the bolts to draw the assembly together. Parts should align and assemble without excessive force.</p> <p>Note: installing the lock wire on the lower bolts during this step may be easier than at the end.</p>	
8	Install the dowel pin(s) into the top of the chair.	
9	Continue assembly. Follow Actuator Alignment Instructions .	Reference Document: <u>Rotavator Actuator Alignment Instructions</u>

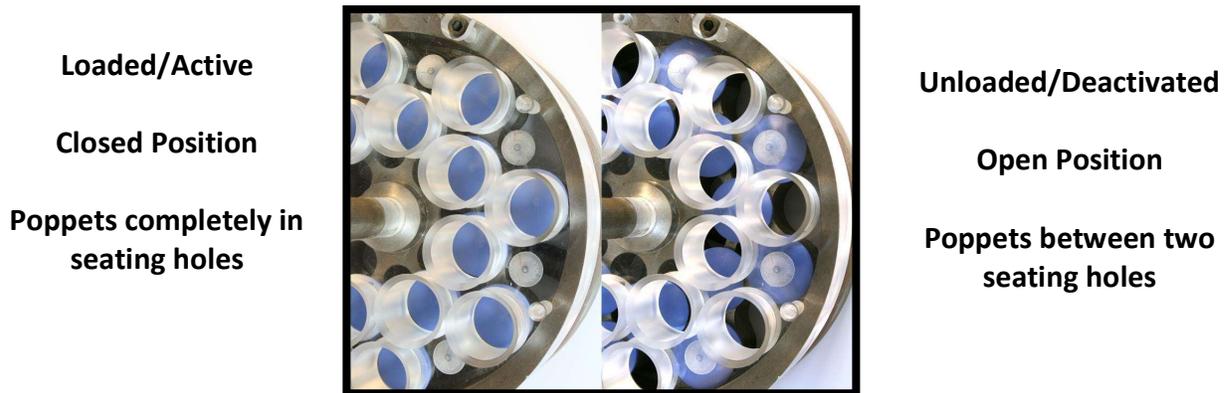
Important Notes:

- All Lockwire connections should be completed per ACI PB-0105.
 - (www.aciservicesinc.com/support)
- All dynamic contact surfaces should be greased with white lithium grease, or equivalent.
- All O-rings should be liberally greased with white lithium grease, or equivalent, unless noted otherwise.



Rotavator™ Actuator Alignment Instructions:

The alignment of the poppets in the loaded, or active, position is crucial to the successful operation of the Rotavator - a single deck rotating deactivator valve. In this document, the method for successful alignment of the Rotavator will be covered step by step in the **Actuator Alignment** section. Once completed, the valve will cycle correctly and provide the most efficient use in both the loaded and unloaded positions.



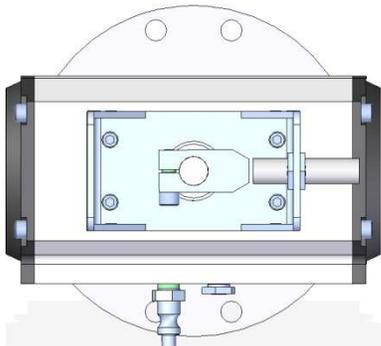
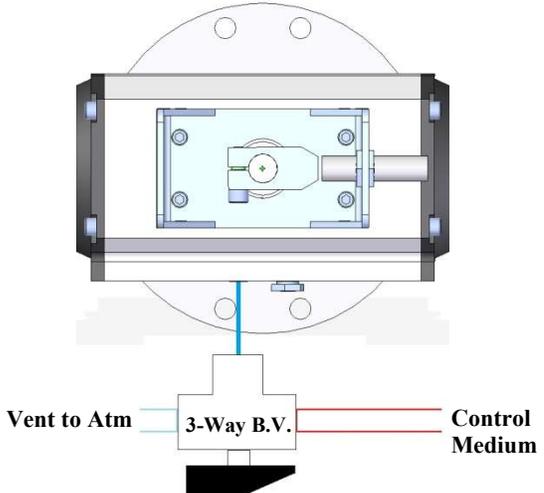
Proper sensory feedback, using proximity sensors, is also covered in this document. The Rotavator has an optional housing for installation of a sensor. Required adjustments and operation are covered in the **Proximity Switch Assembly** section.

Read the complete instructions before beginning the actuator alignment process.



Actuator Alignment:

A clean, compressed air source will be required to cycle the actuator in order to accurately align the actuator. Actuation pressure must be within the specified limits for the actuator.

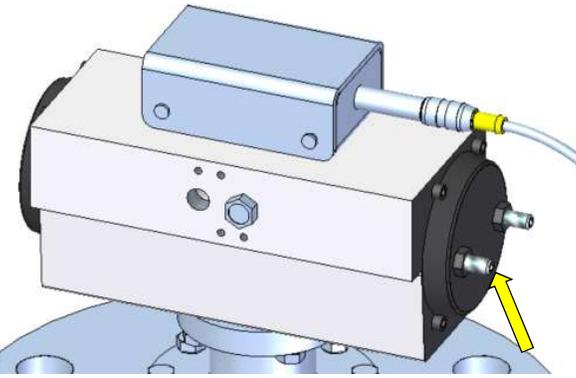
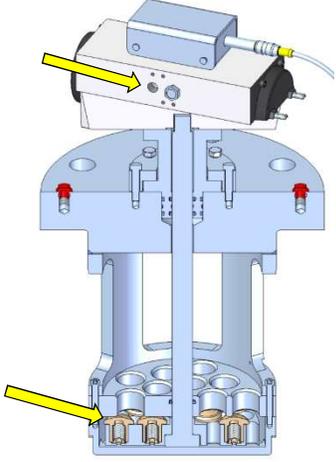
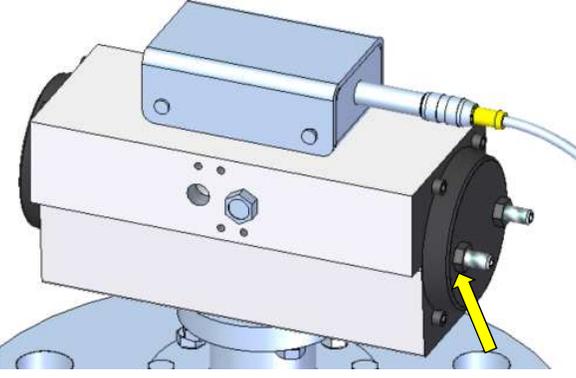
Methods for Manually Cycling Actuator	
Quick Connect Fitting Method	3-Way Valve Method
<p>This method uses typical air hose fittings that should be common at most compressor stations.</p>	<p>This method requires more components but is significantly faster when aligning actuators.</p>
	
<p>Note: The male, or plug, fitting must be used so that it vents the pressure off the actuator when the hose is disconnected.</p>	<p>Note: This 3-way ball valve must be installed such that the pressure is relieved from the actuator when unloading.</p>

Regardless of method used, the actuator must be cycled such that the control port is either at actuation pressure or vented to atmosphere. Required components can be purchased from ACI Services, Inc.

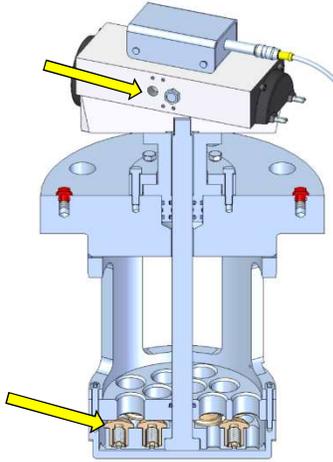


PLEASE KEEP HANDS CLEAR OF THE ROTAVATOR WHEN ACTUATING!

Rotavator Actuator Alignment Instructions:		
No	Description	Related Figure or Reference Document
1	<p>It is recommended to set the Rotavator valve on a bench or elevated surface to make valve adjustment easier.</p> <p>Assemble Rotavator together including valve cap. DO NOT bolt down the clamp ring yet.</p>	
2	<p>With actuator slid over shaft, rotate actuator until poppets in the valve are seated.</p> <p>Once poppets are seated, bolt down the ring clamp.</p> <p>At this time, it is recommended to mark the valve with a marker so it can be determined how far the actuator rotates. The Rotavator valve may need to be laid on its side in order to better view the guard when it rotates.</p>	
3	<p>Supply shop air (90-130 psi) to the actuator to verify proper operation of the Rotavator.</p> <p>Determine how far the Rotavator is rotating. It is recommended that the Rotavator rotate 1-1/2 holes. This means a poppet will rotate through the hole adjacent to it and end up half way between the next set of holes. (See note below)</p> 	

<p>4</p>	<p>If necessary, remove air pressure to adjust the max travel stop. Turning the set screw in reduces the valve rotation. Turning the set screw out increases the valve rotation.</p>	
<p>5</p>	<p>Supply air pressure to the actuator to verify the amount of valve rotation.</p> <p>If necessary, repeat steps 3 through 5 until the Rotavator rotates the proper amount of travel.</p> 	
<p>6</p>	<p>Once Rotavator is set, verify that the adjustment set screw will not move by tightening the jack nut on the set screw.</p>	



7	<p>Supply and remove air to the Rotavator again to verify proper travel.</p> <p>Rotavator actuator is now set and can be removed from the valve cap for shipping.</p> 	
8	<p>Once set, label the actuator so it is installed with the proper Rotavator assembly.</p>	
9	<p>Continue to install Rotavator into Cylinder.</p>	<p>Reference Document: Rotavator Installation Instructions</p>

**ROTAVATORS CAN BE CONFIGURED TO FAIL-SAFE LOADED.
THIS IS USUALLY DESIRED WHEN DEACTIVATING CRANK ENDS.
CONTACT ACI ENGINEERING FOR INSTRUCTIONS.**

Important Notes:



The actuators are Spring-Return and are very powerful. **DO NOT** put fingers or other sensitive objects anywhere that might be in the path of moving components. Injury may result.

- It is recommended to set the Rotavator to rotate 1-1/2 holes in order to compress the springs in the actuator sufficiently so the valve can close properly during operation. On some designs with a limited number of holes in a bolt circle (i.e. 4 or 5), the Rotavator may only need to rotate a 1/2 of a hole to achieve proper compression of the springs.
- It is not recommended to adjust the max travel stop *with* control pressure applied.
- Although field repair of the actuator may be possible, ACI recommends replacement of the entire “old” actuator as an assembly. The “old” actuator can then be returned for evaluation or replacement.

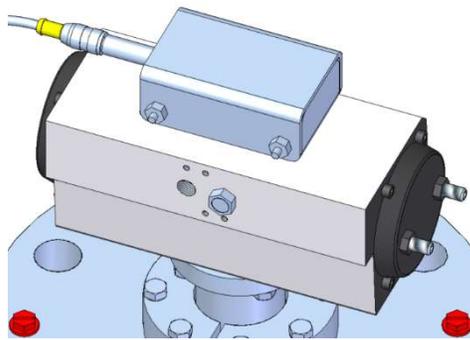


Proximity Switch Assembly:

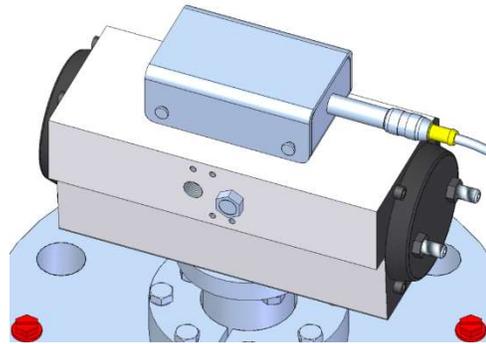
The optional proximity switch assembly is easily accessible and can be adjusted either before or after installation into the cylinder, at the discretion of the installer. It is recommended that the actual proximity sensor not be installed until the assembly is installed to prevent damage.

Orientation:

The proximity switch assembly can be oriented to point either direction by rotating the bottom cover. This requires removing both covers - the top cover is held in place with two machine screws and the bottom cover is held in place with four socket head cap screws. With these removed the cover can be rotated to the desired position.



Proximity Sensor facing Left



Proximity Sensor facing Right

Adjusting Proximity Switch

Positive Feedback:

Positive signal when the valve is activated (air pressure applied).

With the top cover removed and **control pressure applied** to the actuator.

Loosen the cap screw on the sensor target so that it freely rotates. Install the proximity sensor loosely and point the sensor target at the sensor. Tighten the cap screw.

Set the gap between the proximity sensor and the sensor target per the sensor OEM's recommendation. Cycle the valve to ensure that there are no clearance issues. Reinstall top cover.

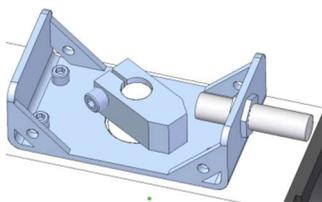
Negative Feedback:

Positive signal when the valve is deactivated (no air pressure applied).

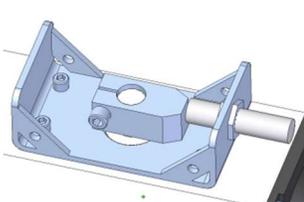
With the top cover removed and **NO control pressure applied** to the actuator.

Loosen the cap screw on the sensor target so that it freely rotates. Install the proximity sensor loosely and point the sensor target at the sensor. Tighten the cap screw.

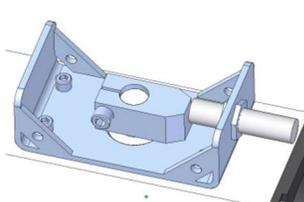
Set the gap between the proximity sensor and the sensor target per the sensor OEM's recommendation. Cycle the valve to ensure that there are no clearance issues. Reinstall top cover.



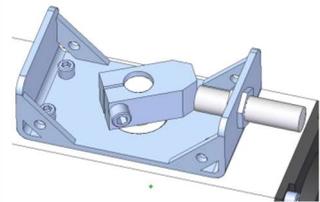
Deactivated. No Signal.



Activated. Positive Signal.



Deactivated. Positive Signal.

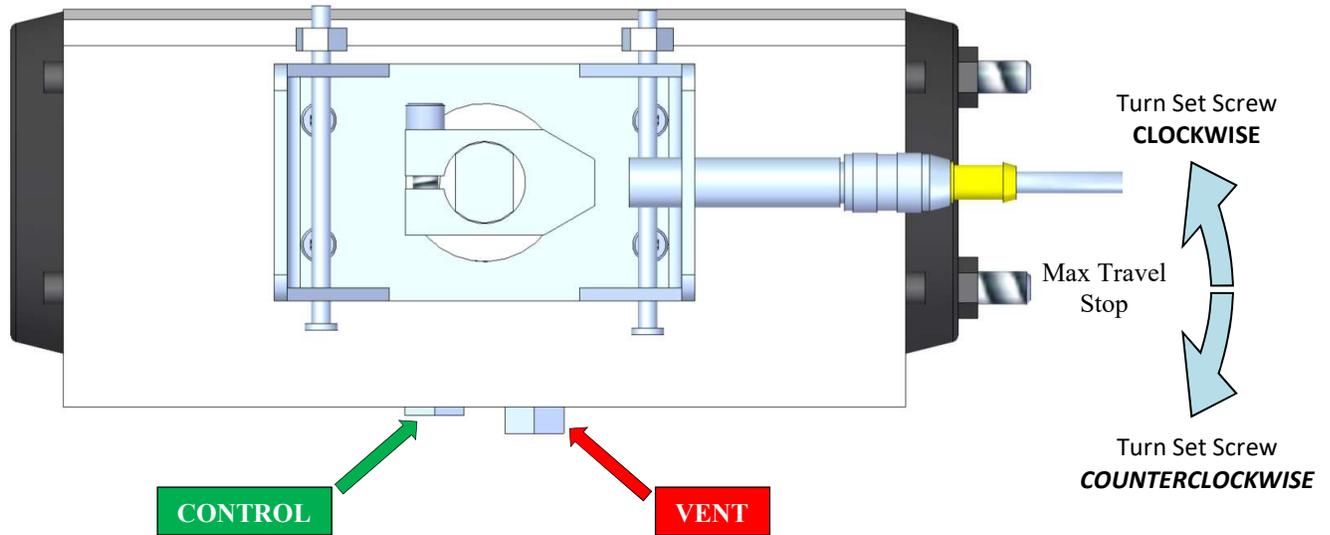


Activated. No signal.



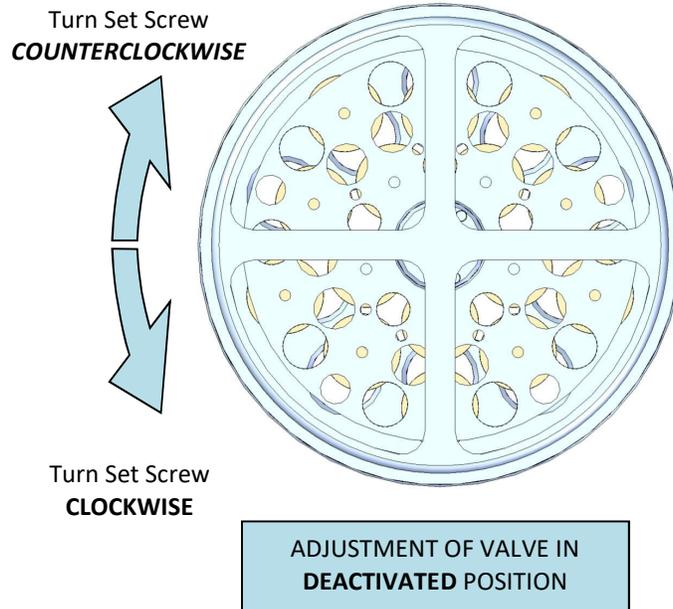
Rotavator™ Actuator Adjustment Reference Sheet:

Actuator



Top Down View. Arrows refer to *actuator* rotation.

Valve



Bottom Up View. Arrows refer to *guard* rotation.



Rotavator™ Installation Instructions:

Summary:

The installation of the Rotavator, once assembled and aligned per the requisite instructions, is straightforward. The following document outlines the assembly procedure that should apply to most Rotavators.

Read the complete instructions before beginning the installation.

[Refer to the assembly drawing and parts list for additional information]

No.	Description
1	Install the Rotavator valve with gasket into the valve bore.
2	Assemble valve cap gasket and valve cap on to Rotavator valve. Verify all O-rings and seals are in place before assembly. Valve cap should slide over Rotavator shaft. Torque valve cap to required specs.
3	Install 1/4 inch NPT air fitting into the Rotavator actuator air supply port.
4	Supply instrument air pressure (approx. 90-130 psi) to the actuator. Slide Rotavator actuator with actuator mount over Rotavator valve shaft. Verify all O-rings and seals are in place before assembly. Actuator mount should seat against valve cap.
5	Verify poppets are seated in valve by trying to rotate pressurized actuator. If required, rotate pressurized actuator until poppets seat in place.
6	Install split ring clamp over actuator spool mount. Tighten and torque cap screws as required.
7	Air pressure may be removed from the actuator. It is recommended to verify Rotavator is operating properly as air pressure is supplied and removed.
8	Install control air tubing to actuator. Again, it is recommended to verify proper operation of the Rotavator as air pressure is supplied and removed.
9	On top of the actuator, it is recommended to verify the proximity target setting. If needed, the sensor target can be adjusted to fit the control system requirements.



Important Notes:

- Take precautions to not chafe O-rings or back up rings
- Ensure flat gasket is under nose
 - **Method Outlined Above:** Place gasket in cylinder before installation
 - **Alternate Method:** In some cases, the gasket can “fall” out of position in the cylinder. In these cases, it may be required to have the gasket on the Rotavator nose during installation. A generous film of grease around the nose of the valve will typically hold the gasket in place for installation.
- Orient actuator in proper direction when lowering into position. This will vary on a case by case basis due to tubing, electrical, and general space constraints.
- Ensure there is access to all tubing connections and vents.
- Solenoid for air lines needs to be a vented 3-way solenoid.
- If you want to actuate the Rotavator with the cylinder under pressure and not running, please contact ACI Engineering.
- Air supply line recommendations
 - 3/8 inch diameter
 - MAX 100 ft length
 - MAX 4 actuators
 - If your conditions are different, please contact ACI Engineering.