VascuLathe®-ACS Series
Stage User's Manual

P/N: EDS116 (Revision 1.05.00)

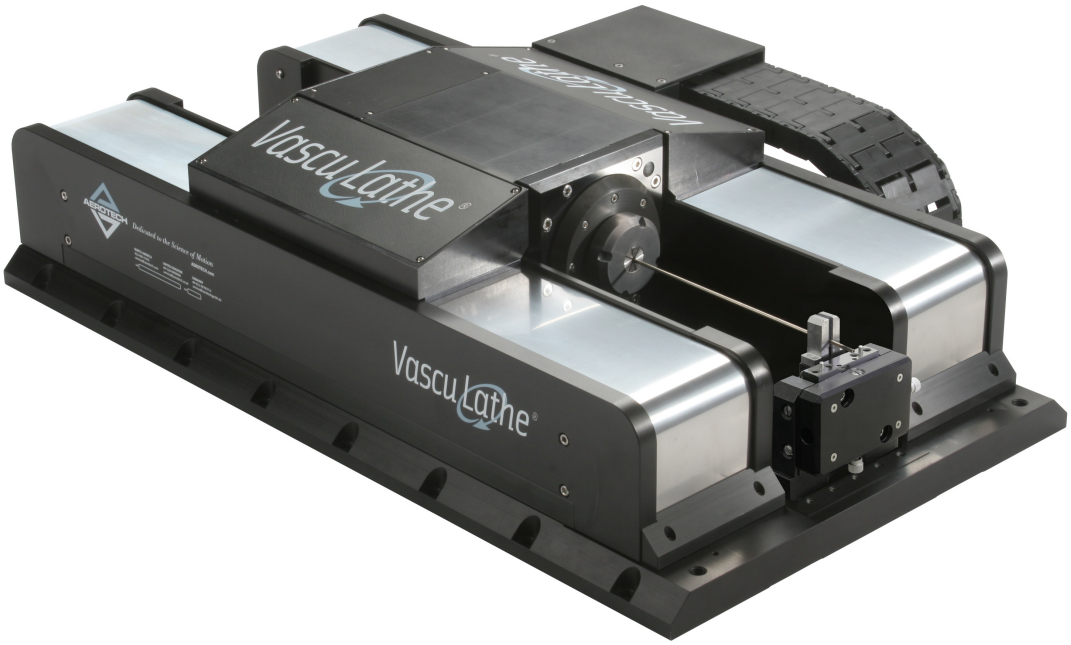

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Table of Contents

List of Figures

List of Tables

Chapter 1: Overview

The VascuLathe®-ACS series dual axis positioning stage represents a revolutionary approach to satisfying the demanding requirements of tubular manufacturing applications. This fully integrated motion system couples automated material handling with high performance direct drive linear and rotary motion.

The VascuLathe®-ACS has been designed with a collet chuck that supports ER25 or ER40 collets (manufactured to DIN6499 specs) to allow for a wide range of materials and applications. This product is intended for light industrial manufacturing or laboratory use.

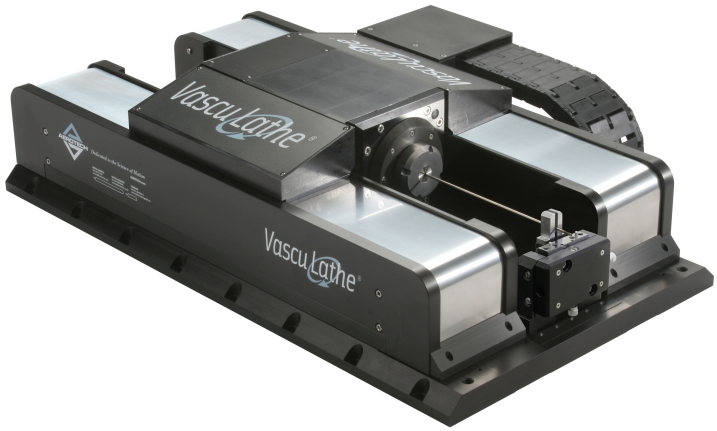


Figure 1-1: VascuLathe®-ACS Series Positioning Stage

NOTE: Aerotech continually improves its product offerings; listed options may be superseded at any time. Refer to the most recent edition of the Aerotech Motion Control Product Guide for the most current product information at www.aerotech.com.

NOTE: This manual should be read in its entirety before operating the VascuLathe®-ACS system.

NOTE: For the wet cut option, it is recommended that the rotary seal be replaced before 1000 hours of service. Failure to follow the maintenance procedures outlined in Section 4.3.3. Wet Cut Rotary Union Seal Replacement will result in voiding of warranty.

DANGER: To minimize the possibility of electrical shock and bodily injury or death, disconnect all electrical power prior to making any electrical connections.

1.1. Standard Features

1.1.1. Linear Axis

The main feature of the linear axis is its proprietary linear drive technology coupled with a rigid mechanical design allowing for high-speed, accurate positioning performance.

All VascuLathe®-ACS stages include a fully-sealed design. Metal waycovers are designed to protect the internal components (linear bearings and encoder, for example) from damage by preventing dust or debris from entering the stage. The external stage surfaces have a black hardcoat finish to withstand rugged environments.

To aid in stage setup and mounting, the stage base plate mounting holes are accessible without removing any components.

A pair of sealed linear bearings are common to all VascuLathe®-ACS series stages. The bearings provide smooth motion and excellent stiffness characteristics.

Two options to improve the already outstanding accuracy of the VascuLathe®-ACS series are HALAR and HALSF. HALAR is linear error correction for accuracy and repeatability, and HALSF systems include improved straightness and flatness characteristics.

Other features include optical limit switches mounted at each end of travel. These switches are configured as normally-closed. If the stage is driven beyond these electrical limits, a mechanical hard stop is in place slightly past each limit switch.

The VascuLathe®-ACS is offered with a non-contacting linear encoder with an achievable resolution of .001 µm, and accuracies of ±1.0 µm.

Travels available are 200 mm to 300 mm.

1.1.2. Rotary Axis

All VascuLathe®-ACS stages come standard with a direct drive brushless motor with a non-contacting integral rotary union. These features combine to create a low friction, low maintenance rotary stage capable of high accelerations and low positioning error. With a non-contact rotary union, there are no seals to replace or lubricate, allowing for a lifetime of maintenance free performance. The brushless, slotless motor design allows for extremely high torque coupled with smooth motion. There are no brushes to wear, no belts to tension, and no gears to wear resulting in a completely maintenance-free motor.

The VascuLathe®-ACS is available with either an ER25 or ER40 style collet chuck. Aerotech recommends using an ER25 collet for holding requirements of 1 mm to 16 mm and using an ER40 collet for holding requirements of 15.5 mm to 30 mm.The collet is retained with a threaded collet nut enabling quick changeover. It is configured in a “fail-safe” normally-closed mode where full clamping force is applied when no air pressure is present.

NOTE: Aerotech recommends using only electro-polished collets manufactured to DIN6499 specifications.

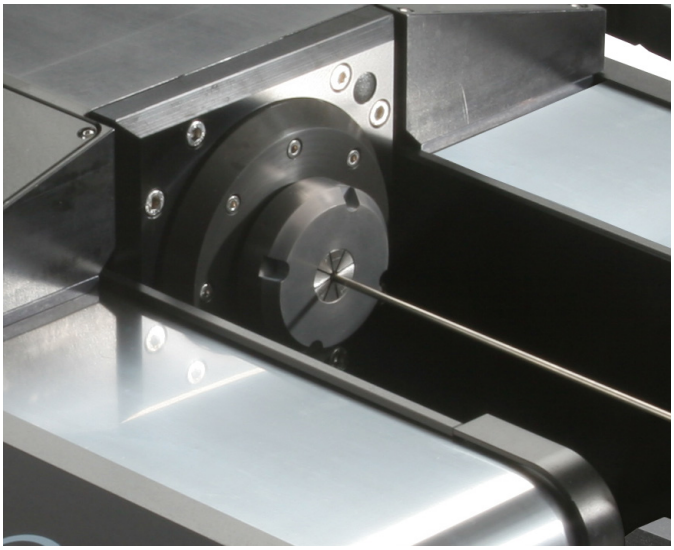


Figure 1-2: VascuLathe®-ACS Rotary Stage with ER Collet

1.2. Optional Features

1.2.1. CMS (Cable Management System) Options

The VascuLathe®-ACS can be ordered so that an optional cover is included to enclose the moving CMS components from the system operator.

NOTE: The cover is a stationary guard designed to isolate the operator from moving components in the CMS and is not intended to prevent contaminants from entering.

1.2.2. Wet Cut Option

Use the wet cut rotary union configuration for fluid delivery (@100 psi max pressure) in wet laser cutting applications. Connect a pressure vessel to the 1/2 NPT tapped hole located on the rear of the rotary stage. The length of the pressure vessel is dependent on the length of the tube being cut. This option is only available on stages with an ER25 collet chuck. See Section 3.3. Load Capability, Section 4.3.3. Wet Cut Rotary Union Seal Replacement, and Section 4.4. Wet Cut Rotary Union Removal for details regarding use and maintenance of the wet cut rotary union.

NOTE: The purchase of a ringseal will also be required based on the tube diameter used in the cutting application. Consult Aerotech for more information.

1.2.3. Tooling Options

VascuLathe®-ACS can be equipped with two types of tube advance systems that give the customer a more advanced, highly integrated tubular manufacturing system.

- **-AG**: This option equips the system with a parallel gripper for automated tube advancement along with a Y/Z adjustment stage. The adjustment stage has a travel range of ±0.75 mm to aid in the alignment of material support bushings (see Section 2.7. (-AG) Alignment / Gripper Operation).
- **-G**: This option equips the system with a parallel gripper for automated tube advancement and material handling (see Section 2.8. (-G) Gripper Operation).

1.2.4. Gripper Jaws Option

This option is selected when a tooling option is ordered and is sized based on application requirements. The gripper supplied on the VascuLathe®-ACS has a 10 mm stroke and therefore requires the selection of different jaw types depending on the tube size being processed. Jaws have been sized to cover the ranges of tubes the ER25 and ER40 options can support (0 mm - 30 mm). Refer to Table 3-2 for a list of jaw options.

1.2.5. Pneumatics Option

This option is offered in three configurations and is supplied with every VascuLathe®-ACS system. Two configurations (-PNG and -PN) include the required filters, driers, solenoids, relays, fittings, valves, and hose required to connect the VascuLathe®-ACS. The third configuration (-FD) includes only the filter and dryer assembly to condition the incoming air.

- **-PNG**: This option will supply the pneumatics to control the air supply to both the collet and the optional gripper.
- **-PN**: This option is ordered when the pneumatics to control the air supply are required for the collet only.
- **-FD**: This option is ordered when the customer will implement their own pneumatics controls. The filter/dryer assembly is supplied to guarantee the conditioning of incoming air.

Refer to the documentation package shipped with your system for proper interconnection of the pneumatics.

1.2.6. Electronics / Controller Option

The VascuLathe®-ACS stage can be purchased as part of a complete Aerotech motion control system, which is adjusted at the factory for optimum performance. If bought as a complete system, setup usually involves connecting a stage to the appropriate drives with the cables provided. Refer to your electrical documentation package for further information.

1.3. Model Numbers

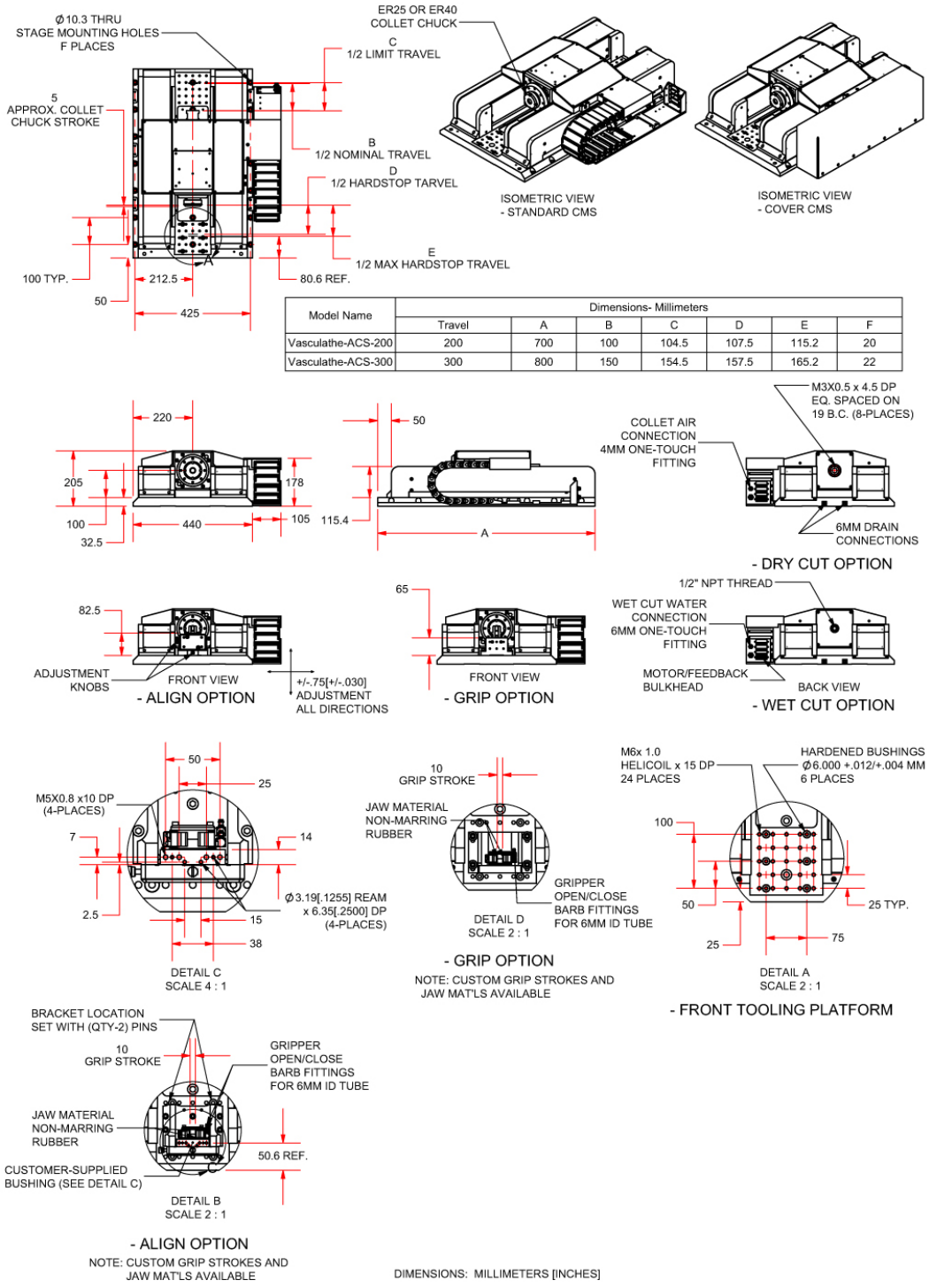
The stage model number indicates the optional features on a particular stage.

Example: VascuLathe-ACS-300S-ER25-WC-AG-J0-10-PNG

Table 1-1: Model Numbering System

VascuLathe, Direct Drive Linear and Rotary Motion	
-ACS	Direct drive rotary stage with integral ER-style collet chuck
Linear Travel / Cable Management System (CMS) Style	
-200S	200 mm linear travel, with standard cms configuration
-200C	200 mm linear travel, with covered cms configuration
-300S	300 mm linear travel, with standard cms configuration
-300C	300 mm linear travel, with covered cms configuration
Collet Type	
-ER25	Air-actuated ER25 collet chuck, normally closed Supports tube diameters from 1 mm to 16 mm
-ER40	Air-actuated ER40 collet chuck, normally closed Supports tube diameters from 15.5 mm to 30 mm
Wet Cut / Dry Cut	
-DC	Dry cut, standard option for both ER25 and ER40 configurations
-WC	Wet cut, used only on ER25 configuration. Limits tube size to 12 mm dia.
Gripper	
-AG	Gripper with X/Y bushing alignment
-G	Gripper Only
Gripper Jaws	
-J0-10	Gripper jaws for tube diameters ranging from 0 mm –10 mm
-J8-18	Gripper jaws for tube diameters ranging from 8 mm –18 mm
-J16-26	Gripper jaws for tube diameters ranging from 16 mm –26 mm
-J24-34	Gripper jaws for tube diameters ranging from 24 mm –34 mm
-J32-40	Gripper jaws for tube diameters ranging from 32 mm –40 mm
Pneumatics	
-PNG	Pneumatics kit for ER collet and optional gripper
-PN	Pneumatics kit for ER collet
-FD	Pneumatics kit, filter/dryer assembly only

1.4. Dimensions



Model Name	Dimensions- Millimeters						
	Travel	A	B	C	D	E	F
Vasculathe-ACS-200	200	700	100	104.5	107.5	115.2	20
Vasculathe-ACS-300	300	800	150	154.5	157.5	165.2	22

Figure 1-3: VascuLathe®-ACS Dimensions

1.5. Safety Procedures and Warnings

The following statements apply wherever the Warning or Danger symbol appears within this manual. Failure to observe these precautions could result in serious injury to those individuals performing the procedures and/or damage to the equipment. Operators should be trained before operating this equipment.

DANGER: To minimize the possibility of electrical shock and bodily injury or death, disconnect all electrical power prior to making any electrical connections.

DANGER: To minimize the possibility of electrical shock and bodily injury or death when any electrical circuit is in use, ensure that no person comes in contact with the circuitry when the VascuLathe®-ACS is connected to a power source.

DANGER: To minimize the possibility of bodily injury or death, disconnect all electrical power prior to making any mechanical adjustments.

DANGER: Moving parts of the VascuLathe®-ACS can cause crushing or shearing injuries. All personnel must remain clear of any moving parts.

WARNING: If the VascuLathe®-ACS is used in a manner not specified by the manufacturer, the protection provided by the VascuLathe®-ACS can be impaired and result in damage, shock, injury or death.

WARNING: Cables can pose a tripping hazard. Securely mount and position all VascuLathe®-ACS cables to avoid potential hazards.

WARNING: Do not expose the VascuLathe®-ACS to environments or conditions outside the specified range of operating environments. Operation in conditions other than those specified can cause damage to the equipment.

WARNING: The VascuLathe®-ACS must be mounted securely. Improper mounting can result in injury and damage to the equipment.

WARNING: Use care when moving the VascuLathe®-ACS. Manually lifting or transporting the VascuLathe®-ACS can result in injury.

WARNING: Only trained personnel should operate, inspect, and maintain the VascuLathe®-ACS.

WARNING: This VascuLathe®-ACS is intended for light industrial manufacturing or laboratory use. Use of the VascuLathe®-ACS for unintended applications can result in injury and damage to the equipment.

WARNING: Before using this VascuLathe®-ACS, perform an operator risk assessment to determine the needed safety requirements.

1.6. EC Declaration of Incorporation

Manufacturer: Aerotech, Inc.
101 Zeta Drive
Pittsburgh, PA 15238
USA

herewith declares that the product:
Aerotech, Inc. VascuLathe®-ACS Stage
is intended to be incorporated into machinery to constitute machinery covered by the Directive 2006/42/EC as amended;

does therefore not in every respect comply with the provisions of this directive;

and that the following harmonized European standards have been applied:
EN ISO 12100-1,-2:2003+A1:2009
Safety of machinery - Basic concepts, general principles for design
ISO 14121-1:2007
Safety of machinery - Risk assessment - Part 1: Principles
EN 60204-1:2005
Safety of machinery - Electrical equipment of machines - Part 1: General requirements
and further more declares that
it is not allowed to put the equipment into service until the machinery into which it is to be incorporated or of which it is to be a component has been found and declared to be in conformity with the provisions of the Directive 2006/42/EC and with national implementing legislation, i.e. as a whole, including the equipment referred to in this Declaration.

This is to certify that the aforementioned product is in accordance with the applicable requirements of the following Directive(s):
2011/65/EU RoHS 2 Directive

Authorized Representative: Manfred Besold
Address: AEROTECH GmbH
Süd-West-Park 90
D-90449 Nürnberg

Name / Alex Weibel
Position Engineer Verifying Compliance
Location Pittsburgh, PA
Date September 2010

Chapter 2: Installation

This chapter describes the installation procedure for the VascuLathe®-ACS stage, including handling the stage properly, preparing the mounting surface to accept the stage, securing the stage to the mounting surface, attaching the payload, and making the electrical connections.

WARNING: Installation must follow the instructions in this chapter. Failure to follow these instructions could result in injury and damage to the equipment.

2.1. Unpacking and Handling the Stage

Carefully remove the VascuLathe®-ACS from the protective shipping container. Before operating the VascuLathe®-ACS, it is important to let the VascuLathe®-ACS stabilize at room temperature for at least 12 hours. Allowing the VascuLathe®-ACS to stabilize to room temperature will ensure that all of the alignments, preloads, and tolerances are the same as they were when tested at Aerotech. Use compressed nitrogen or clean, dry, oil-less air to remove any dust or debris that has collected during shipping. Set the VascuLathe®-ACS on a smooth, flat, and clean surface.

Each VascuLathe®-ACS has a label listing the system part number and serial number. These numbers contain information necessary for maintaining or updating system hardware and software. Locate this label and record the information for later reference. If any damage has occurred during shipping, report it immediately.

WARNING: Improper handling could adversely affect the VascuLathe®-ACS's performance. Use care when moving the stage. Manually lifting or transporting the stage can result in injury.

WARNING: Lift the stage only by the base at [QTY-3] 1/2-13 tapped holes. Do not use the stage table or motor as lifting points.

2.2. Preparing the Mounting Surface

The mounting surface should be flat and have adequate stiffness in order to achieve the maximum performance from the VascuLathe®-ACS. When the VascuLathe®-ACS series stage is mounted to a non-flat surface, the stage can be distorted as the mounting screws are tightened. This distortion will decrease the overall accuracy of the stage. Adjustments to the mounting surface must be done before the stage is secured.

NOTE: To maintain accuracy, the mounting surface should be flat within 1 µm per 50 mm.

NOTE: The VascuLathe®-ACS base is precision machined and verified for flatness prior to product assembly at the factory. If machining is required to achieve the desired flatness, it should be performed on the mounting surface rather than the VascuLathe®-ACS base. Shimming should be avoided if possible. If shimming is required, it should be minimized to improve the rigidity of the system.

2.3. Securing the Stage to the Mounting Surface

Secure the stage to the mounting surface with the M8 or 5/16 SHCS. If necessary, move the stage carriage to access the base plate mounting holes (refer to Figure 2-1).

WARNING: The VascuLathe®-ACS must be mounted securely. Improper mounting can result in injury and damage to the equipment.

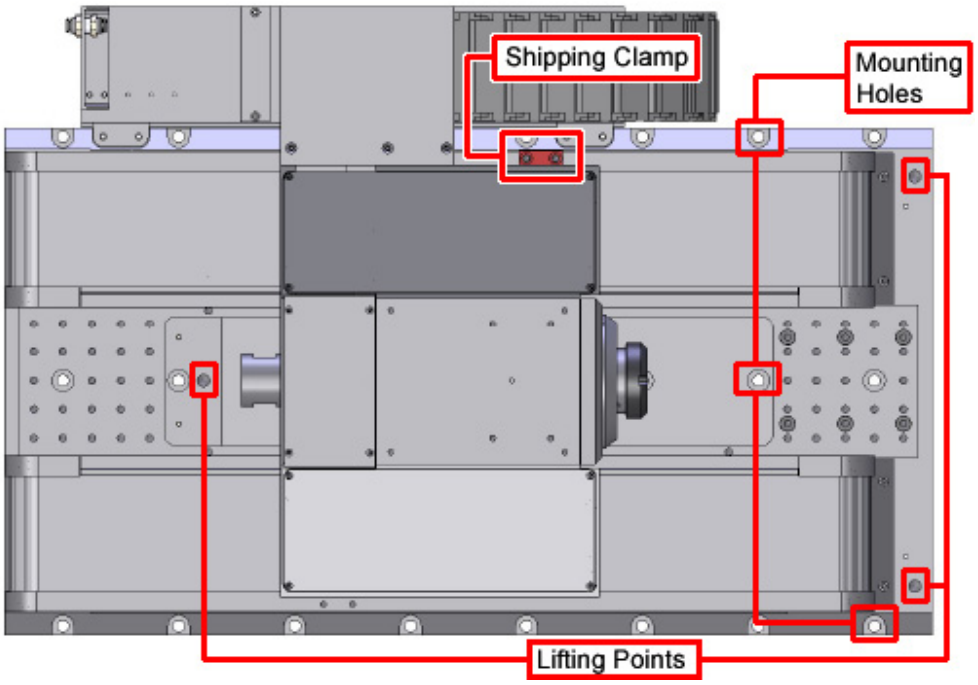


Figure 2-1: VascuLathe®-ACS Stage Showing Mounting Holes (Top View)

WARNING: Do not attempt to move the VascuLathe®-ACS's carriage (or table top) until the lifting brackets and shipping brackets have been removed. Moving the carriage with the lifting brackets and shipping brackets installed can cause permanent damage to the VascuLathe®-ACS.

2.4. Attaching the Payload to the Stage

To prevent damage to the stage or parts, test the operation of the stage before any material is held in the collet or gripper. Proceed with the electrical installation.

Linear

The VascuLathe®-ACS comes standard with two tooling platforms located on the front and the back of the stage. It is important that when mounting fixtures and tooling to these platforms that they are flat to within 10 microns or less to prevent base plate deformations.

Rotary

To operate the collet, clean compressed air or nitrogen must be supplied to the stage (refer to Section 2.10. Air Requirements). The one-touch air inlet fitting accepts 4 mm or 5/32" OD plastic air line. Simply push the air line into the fitting and supply air to the stage. Depending on the pneumatics kit option chosen, Aerotech provides valves, fittings, and airlines in the kit to connect the collet system.

Once air is supplied, material of the appropriate size can be placed in the collet. All collets supplied by Aerotech are clearly labeled with their clamping size range and collet style. Be sure to use only the correct size material in the collet. If an incorrect material size is clamped, the accuracy of the collet could be compromised. Never clamp material or tools that are larger than the specified range. It is also important to have the material or tool inserted at least 2/3 the length of the collet bore. Any less than this could cause permanent deformation of the collet and reduce accuracy (refer to Section 2.5.1. Collet Installation and Removal Procedure for collet installation).

2.5. Changing ACS Workholding Devices

VascuLathe®-ACS stages are equipped with ER25 or ER40 style collets. It is important that only the collets designed for a particular collet holder are used. Contact the factory for more details.

NOTE: Aerotech recommends using only electro-polished collets manufactured to DIN6499 specifications.

NOTE: Various grip diameters are commonly available and can be interchanged following the collet removal and installation procedure detailed in Section 2.5.1. Collet Installation and Removal Procedure

2.5.1. Collet Installation and Removal Procedure

DANGER: To minimize the possibility of bodily injury or death, disconnect all electrical power prior to making any mechanical adjustments.

Step 1: Remove power to the stage before installing or removing the collet.

Step 2: Apply air pressure to loosen the collet chuck.

Step 3: Remove the collet nut by turning it counterclockwise. If necessary, use a spanner wrench (available from Aerotech).

Step 4: Clean the collet housing, collet nut threads, collet nut, and new collet. Acetone or isopropyl alcohol may be used to clean the metal components. A small amount of any general-purpose, high viscosity grease can be applied to the collet taper to help reduce friction and decrease wear.

Step 5: Refer to the instructions in Figure 2-2 to install or remove a collet from the collet nut.

Step 6: Use the collet nut to guide the collet into the stage (Figure 2-3). Make sure that the collet seats properly in its taper. Be sure that air pressure is still being supplied to the stage so the collet chuck is in the open position.

Step 7: Tighten the collet nut. Tightening by hand is sufficient as the clamping force is not determined by the torque of the nut, but by the force of internal springs. Spanner wrenches may be used if desired.

Step 8: Restore power to the stage.

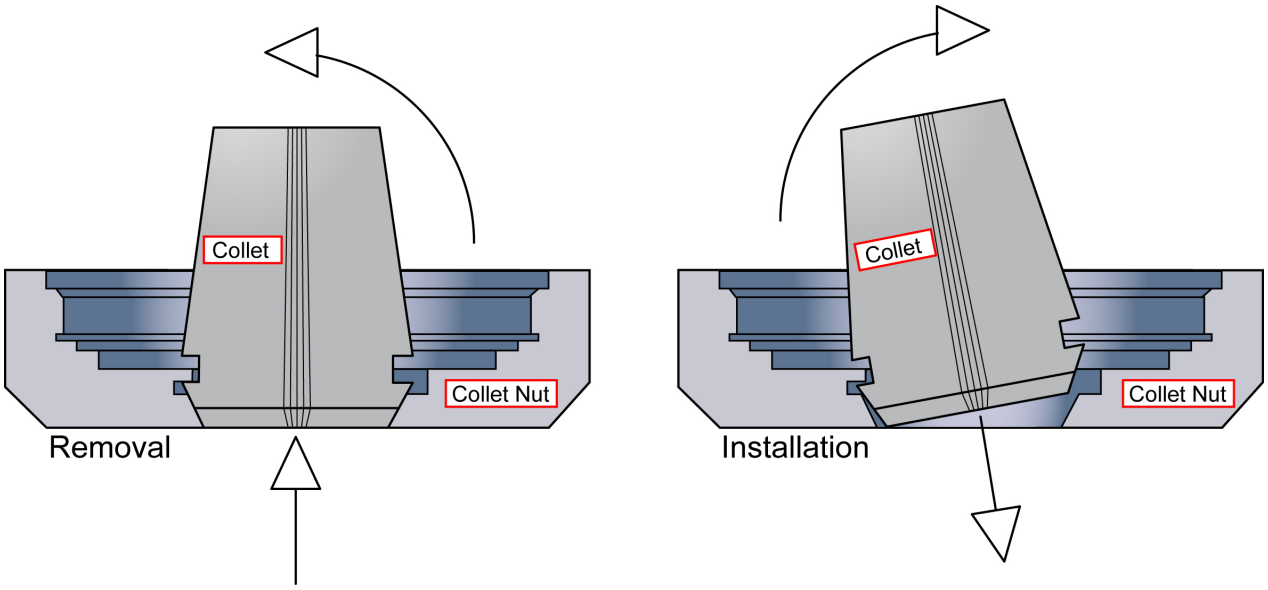


Figure 2-2: Schematic of Collet Insertion Into and Removal From Collet Nut

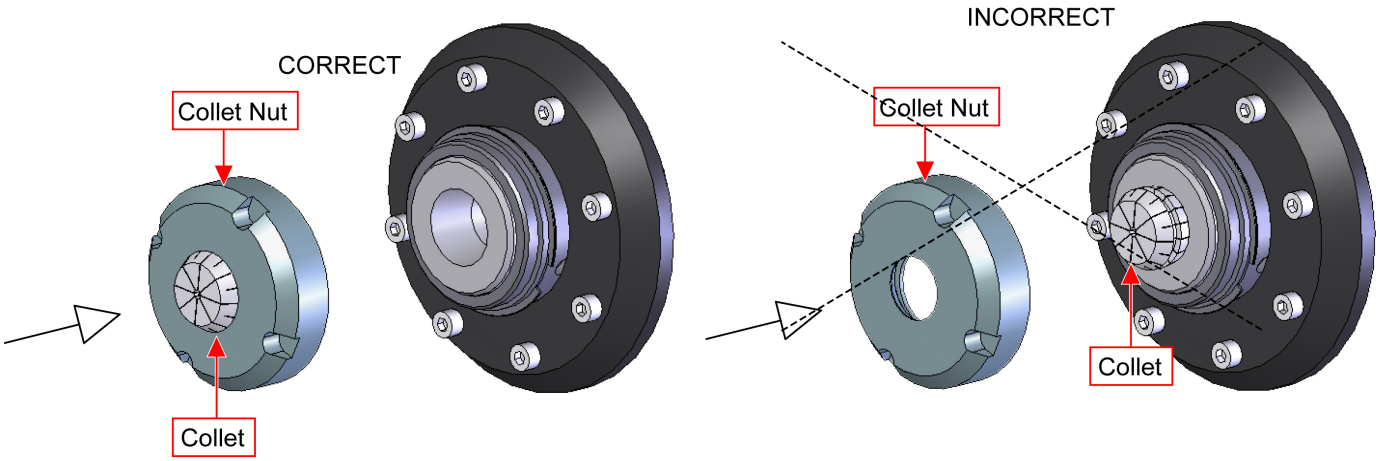


Figure 2-3: Installation Procedure for Collet

2.6. Changing Collet Chucks

VascuLathe®-ACS rotary stages are configurable with ER collet chucks for both ER-25 and ER-40 collets. In order to switch from the ER-25 to the ER-40 (or vice versa), some disassembly is required.

DANGER: To minimize the possibility of bodily injury or death, disconnect all electrical power prior to making any mechanical adjustments.

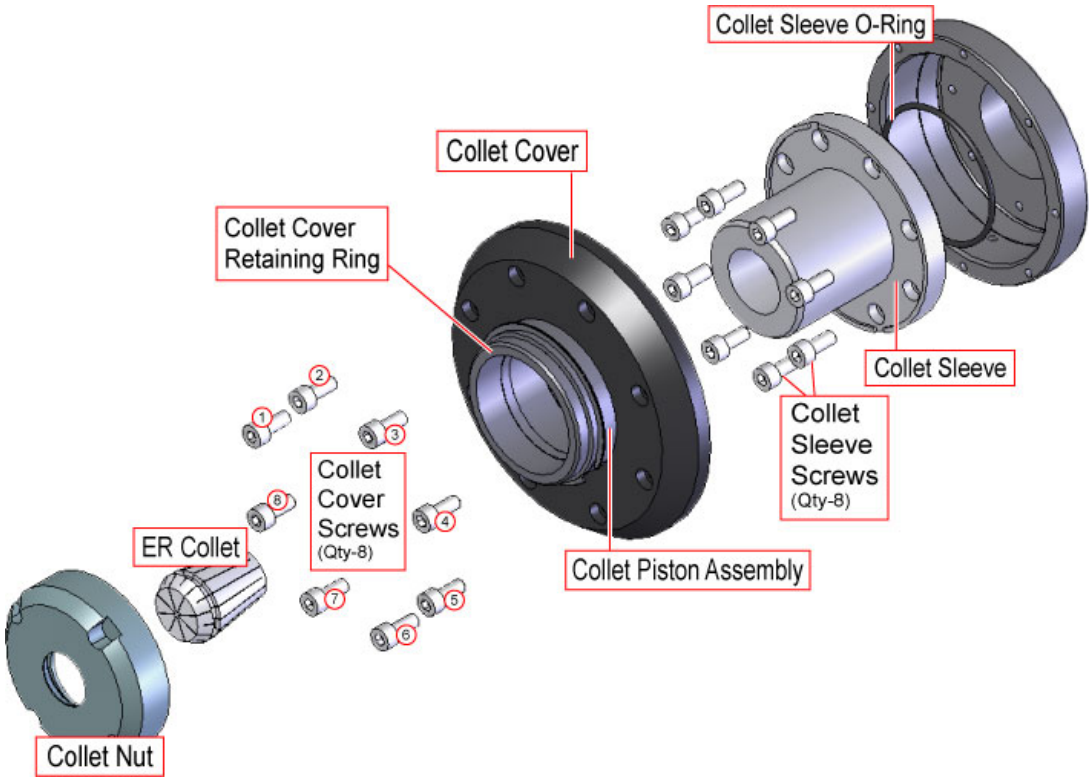


Figure 2-4: Collet Assembly Exploded View

Step 1: Remove power to the stage before installing or removing the collet.

Step 2: Apply air pressure to loosen the collet chuck.

Step 3: Remove the collet nut by turning it counterclockwise. If necessary, use a spanner wrench (available from Aerotech).

Step 4: Remove air pressure from the stage. This will allow the internal springs to relax slightly and ease further disassembly. Further disassembly should only be preformed if the air pressure is completely removed.

Step 5: Referring to Figure 2-4, remove every other collet cover screw. DO NOT remove all of the screws at once as the cap is under tension from several springs and will be damaged or cause bodily harm if removed without caution.

Step 6: Obtain [QTY. 4] M3 x 0.7 x 12 mm long socket head cap screws and thread them into the holes where the previous screws were removed in step 5. Tighten each one until it bottoms out in its hole.

Step 7: Begin removal by loosening the four shorter (factory installed) screws, 1/4 turn at a time. Loosen the screws in a cross pattern. For example, loosen screw number 2, then screw number 6, then screw number 8, then screw number 4, then return to screw number 2. Repeat this process until the longer screws are supporting the tension of the springs entirely. It is then safe to remove the shorter screws completely.

Step 8: Using the same method as in step 7, remove the longer screws until the spring tension is completely relieved.

Step 9: Carefully slide the collet piston assembly out from its housing. Use caution not to tilt the piston assembly in its housing as this could cause damage to the housing, seals, or piston itself.

Step 10: Remove the collet sleeve and collet sleeve O-ring.

Step 11: Thoroughly clean the new collet sleeve and nut as well as all old components. Inspect the seals and O-ring for damage or excessive wear and replace if necessary

Step 12: Insert the collet sleeve O-ring into its groove. Place the new collet sleeve into the shaft. Although the collet sleeve is piloted to ease assembly, it may require some indicating of the taper to achieve the best possible runnout. Finger tighten all eight screws, then tighten in a cross pattern to a torque of 1.8-2.0 Nm (16-18 in-lbs).

Step 13: Reinstall the collet piston assembly into its housing. Use of O-ring lubricant is recommended during reassembly. There are chamfers to help guide the piston into place, but use caution not to twist or damage the seals.

Step 14: Replace the collet piston assembly.

Step 15: Installation of the collet cover is the reverse of removal. Begin with the four 12 mm long screws in every other hole and tighten until they bottom out in their respective holes. Then install the shorter original screws into the remaining holes and tighten in a cross pattern until the collet cover is seated against the shaft. Install the remaining four original screws. Torque all screws to a final torque of 1.8-2.0 Nm (16-18 in-lbs).

Step 16: Apply air pressure to the stage in order to install the collet.

Step 17: Install the new collet and collet nut as described in Section 2.5.1. Collet Installation and Removal Procedure

Step 18: Restore the air supply to the original settings and restore power to the stage.

2.7. (-AG) Alignment / Gripper Operation

This option equips the VascuLathe®-ACS system with a parallel gripper for automated tube advancement along with a Y/Z adjustment stage. The adjustment stage has a travel range of ±0.75 mm to aid in the alignment of material support bushings (refer to Figure 2-5 and Figure 2-1).

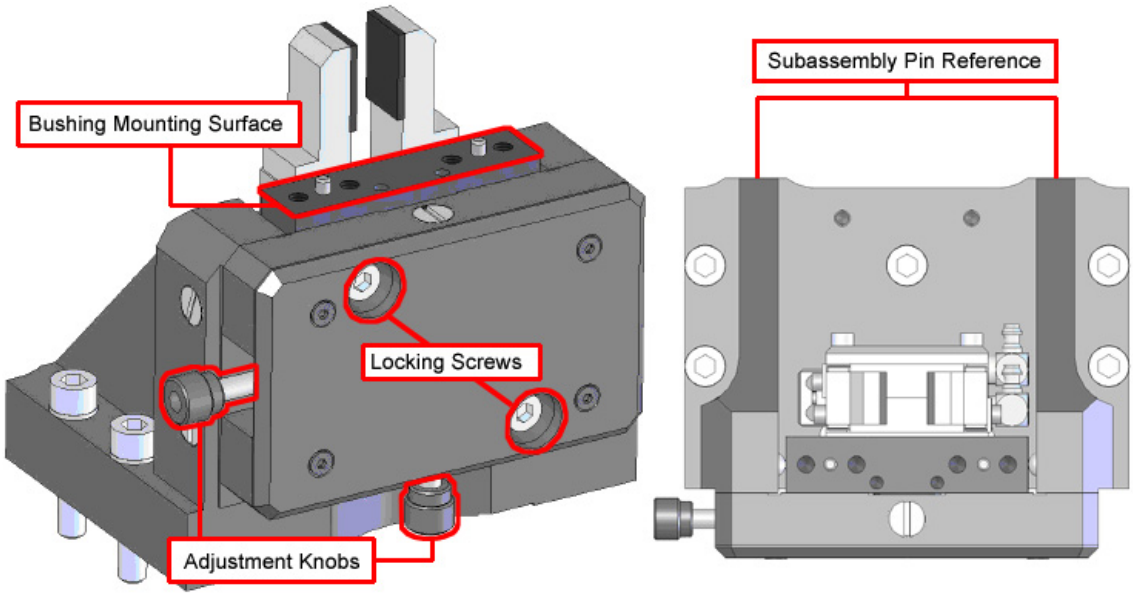


Figure 2-5: Alignment Gripper Detail

Step 1: Place the provided [QTY-2] 6 mm pins in bushing inserts of the base plate. Use the two bushings that are in the middle of the front mounting platform so that tube waste is minimized.

Step 2: Set up the alignment gripper on the front tooling platform and reference it against the pins.

Step 3: Add [QTY-5] M6 socket head screws with washers.

NOTE: Make sure that the assembly is still referenced against 6 mm pins as described in Step 2.

Step 4: Manually index the VascuLathe®-ACS carriage towards the sub assembly and verify that there is no interference.

Step 5: Attach tube support to the alignment mechanism.

NOTE: The tube support or bushing is customer supplied.

Step 6: Loosen [QTY-2] M5 socket head (locking screws) shown in Figure 2-5 so that the alignment mechanism can be adjusted.

Step 7: Feed the part into the collet and through the tube support bushing.

Step 8: Align bushing's vertical and horizontal position using the provided adjustment knobs.

Step 9: Secure the [QTY-2] M5 socket head cap screws that were loosened in Step 6.

Step 10: Connect the provided pneumatics kit to the gripper and adjust the operating pressure for desired grip force.

NOTE: Do not exceed 87 psi to gripper on either the open or closing cycle.

NOTE: Refer to pneumatics layout drawing which is included with the documentation for assembly instructions.

2.8. (-G) Gripper Operation

This option equips the system with a parallel gripper for automated tube advancement and material handling.

Add the gripper option to VascuLathe®-ACS systems as follows:

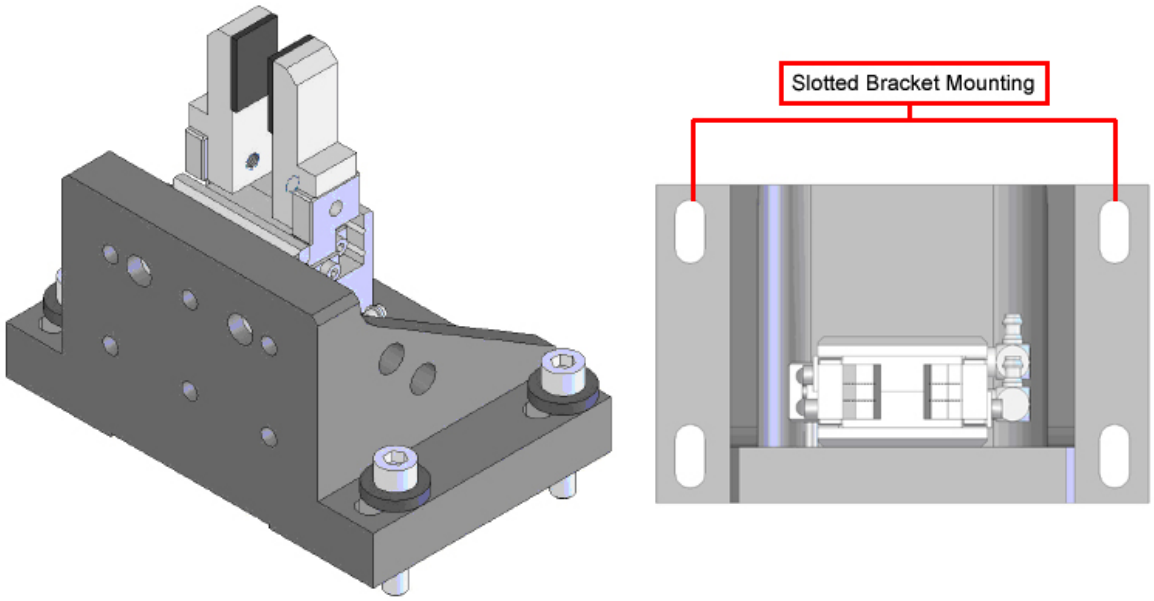


Figure 2-6: Gripper Detail

Step 1: Set up the alignment / gripper on the front tooling platform.

Step 2: Add [QTY-4] M6 socket head screws w/ washers.

Step 3: Manually index the VascuLathe®-ACS carriage towards the sub assembly and verify that there is no interference.

Step 4: Slide the gripper as required using the provided slots in the bracket.

Step 5: Connect the pneumatics kit (optional (-PN) or customer supplied) to the gripper and adjust the operating pressure for desired grip force.

NOTE: Do not exceed 87 psi to gripper on either the open or closing cycle.

NOTE: Refer to pneumatics layout drawing which is included with the documentation for assembly instructions.

2.9. Electrical Installation

Aerotech motion control systems are adjusted at the factory for optimum performance. When the VascuLathe®-ACS is part of a complete Aerotech motion control system, setup usually involves connecting a stage to the appropriate drive chassis with the cables provided. Labels on the system components usually indicate the appropriate connections.

Refer to the appropriate system manuals and documentation for additional installation and operation information. If the system is uniquely configured, a drawing showing system interconnects is supplied.

WARNING: Never connect or disconnect any electrical component or connecting cable while power is applied, or serious damage can result.

WARNING: Use only the cables provided by Aerotech as part of the complete motion control system.

2.10. Air Requirements

The air pressure supplied to the collet holder or gripper is important in ensuring that the material or tool is released properly, or for the optional gripper, that the material is held securely.

- If compressed air is used, it must be filtered to 0.25 microns, dry to 0º F dew point, and oil free.
- If nitrogen is used, it must be 99.99% pure and filtered to 0.25 microns.

The chuck becomes fully open at approximately 4-5.5 bar (60-80 psig) depending on the collet size. Higher pressures will not cause damage to the rotary union, but high flow rates will result. Because of the noncontact rotary union design on collet-equipped stages, a small amount of leakage will occur. Approximate leakage rates of between 10 Lpm (0.5 CFM) and 40 Lpm (1.4 CFM), depending on pressure, will be observed when the collet is open.

NOTE: When operating the VascuLathe®-ACS, supply 5 psi to the collet at all times. This will act as an air purge and help prevent contaminants from entering the rotary union.

2.11. Wet Cut Fluid Requirements

Water or cutting fluid used during wet cut operations must be conditioned to meet certain requirements ensuring seal functionality and service life of the wet cut rotary union.

- Water or cutting fluid must be filtered to 5 microns or better.
- Fluid filter must be installed upstream of the rotary union between pump outlet and rotary union inlet.

Chapter 3: Operating Specifications

The surrounding environment and operating conditions can affect the performance and service life of the VascuLathe®-ACS. This chapter contains general technical information on ideal environmental, operating, and basic product specifications.

3.1. Environmental Specifications

The environmental specifications for the are listed in the following table.

Table 3-1: Environmental Specifications

Ambient Temperature	Operating: 16° to 25° C (61° to 77° F) The optimal operating temperature is 20° C ±2° C (68° F ±4° F). If at any time the operating temperature deviates from 20° C degradation in performance could occur. Contact Aerotech for information regarding your specific application and environment.
	Storage: 0° to 40° C (32° to 104° F) in original shipping packaging
Humidity	Operating: 40 percent to 60 percent RH The optimal operating humidity is 50 percent RH.
	Storage: 30 percent to 60 percent RH, non-condensing in original packaging
Altitude	Operating: 0 m to 2,000 m (0 ft to 6,562 ft) above sea level Contact Aerotech if your specific application involves use above 2,000 m or below sea level.
Vibration	Use the system in a low vibration environment. Excessive floor or acoustical vibration can affect stage and system performance. Contact Aerotech for information regarding your specific application.
Dust Exposure	The VascuLathe® stages have limited protection against dust, but not water. This equates to an ingress protection rating of IP50.
Use	Indoor use only

WARNING: Do not expose the VascuLathe® to environments or conditions outside the specified range of operating environments. Operation in conditions other than those specified can cause damage to the equipment.

3.2. Basic Specifications

Basic VascuLathe®-ACS stage specifications are shown in Table 3-2. Rotary motor specifications are shown in Table 3-3 and linear motor specifications are shown in Table 3-4.

Table 3-2: VascuLathe®-ACS Series Specifications

		Units	VascuLathe-ACS-200	VascuLathe-ACS-300
Travel	Linear	mm	200	300
	Rotary	degrees	360º continuous	
Maximum speed	Rotary	rpm	300	
	Linear	m/s	2.0	
Collet Type (1)		n/a	ER25, ER40	
Tube Capacity		mm	0.5-16.0 (ER25 dry cut)	
			0.5-12.0 (ER25 wet cut)	
			16.0-30.0 (ER40)	
Linear Accuracy		microns	±1.0	
Linear Repeatability		microns	±0.5	
Linear Straightness		microns	±2.0	±3.0
Linear Flatness		microns	±2.0	±3.0
Linear Pitch		arc-sec	8.0	10.0
Linear Yaw		arc-sec	8.0	10.0
Rotary Accuracy	Standard	arc-sec	±30.0	
	HALAR	arc-sec (2)	±5.0	
Rotary Repeat-ability	Standard	arc-sec	±6.0	
	HALAR	arc-sec (2)	±3.0	
Rotary Pin / Collet Runout (3)		microns	<25	
Maximum Load (4)	Axial	N	100	
	Radial	N	50	
	Moment	N-m	20	
Stage mass		kg	95	100
Minimum System Air Pressure (5)		psig	100	
Finish	Stage / Body	n/a	Black hardcoat/black anodize	
	Collet Chuck	n/a	Hardened 440C stainless steel/NiCoTef	
	Waycovers	n/a	Hardened stainless steel	

(1) VascuLathe®-ACS collet chuck accepts Rego-Fix ER collets manufactured to DIN6499 specifications only. The collet type (ER25 or ER40) must be specified at the time of order.

(2) Requires HALAR and part programming as rotary axis.

(3) Measured TIR of precision gage pin chucked with an ultra precision ER collet (DIN6499) 10 mm away from collet face.

(4) Maximum loads are mutually exclusive. Loading limits are due to the collet chuck mechanism. Contact Aerotech directly if part load requirement exceeds specifications.

(5) Collet chuck mechanism is normally-closed. Collet mechanism requires air to open collet chuck. Air supply must be dry (0ºF dew-point) oil-less air OR 99.99% pure Nitrogen. Air or nitrogen must be filtered to 0.25 micron particle size or better.

Table 3-3: VascuLathe®-ACS Rotary Motor Specifications

		S-130-60
Winding Designation		**-A**
Performance Specifications (1,5)		
Stall Torque, Continuous (2)	N-m	4.18
	in-lb	37.0
Peak Torque (3)	N-m	16.73
	in-lb	148.1
Rated Speed	rpm	1,000
Rated Power Output, Continuous	watts	437.9
Electrical Specifications (5)		
BEMF Constant (line to line, max)	Volts pk / krpm	148.9
Continuous Current, Stall (2)	Amp pk	3.4
	Amp rms	2.4
Peak Current, Stall (3)	Amp pk	13.6
	Amp rms	9.6
Torque Constant (4,9)	N-m / Amp pk	1.23
	in-lb / Amp pk	10.9
	N-m / Amp rms	1.74
	in-lb / Amp rms	15.4
Motor Constant (2,4)	N-m / √W	0.446
	in-lb / √W	3.95
Resistance, 25 °C (line to line)	ohms	7.8
Inductance (line to line)	mH	1.80
Maximum Bus Voltage	VDC	340
Thermal Resistance	°C / W	0.85
Number of Poles	P	18

(1) Performance is dependent upon heat sink configuration, system cooling conditions, and ambient temperature
(2) Values shown @ 75 °C rise above a 25 °C ambient temperature, with housed motor mounted to a 330 mm x 330 mm x 13 mm aluminum heat sink
(3) Peak torque assumes correct rms current, consult Aerotech
(4) Torque Constant and Motor Constant specified at stall
(5) All performance and electrical specifications +/- 10%
(6) Losses due to bearings and aerodynamics considered negligible
(7) Maximum winding temperature is 100 °C
(8) Ambient operating temperature range: 0 °C - 25 °C, consult Aerotech for performance in elevated ambient temperatures
(9) All Aerotech amplifiers are rated Apk; use torque constant in N-m / Apk when sizing

Table 3-4: VascuLathe®-ACS Linear Motor Specifications

		BLM-203
Winding Designation		**-A**
Performance Specifications (1,5)		
Continuous Force, 20 psi, 1.4 bar (2)	N	195.0
	lb	43.8
Continuous Force, No Cooling, (2)	N	118.8
	lb	26.7
Peak Force (3)	N	780.1
	lb	175.4
Electrical Specifications (5)		
BEMF Constant (line to line, max)	V / m / sec	25.77
	V / in/ sec	0.65
Continuous Current, 20 psi, 1.4 bar (2)	A, pk	8.70
	A, rms	6.15
Continuous Current, No Cooling (2)	A, pk	5.30
	A, rms	3.75
Peak Current, Stall (3)	A, pk	34.80
	A, rms	24.61
Force Constant, Sinusoidal Drive (4,8)	N / A, pk	22.42
	lb / A, pk	5.04
	N / A, rms	31.70
	lb / A, rms	7.13
Motor Constant (2,4)	N / √W	10.94
	lb / √W	2.46
Resistance, 25 °C (line to line)	Ohms	4.0
Inductance (line to line)	mH	3.20
Thermal Resistance, 20 psi, 1.4 bar	°C / W	0.31
Thermal Resistance, No Cooling	°C / W	0.85
Maximum Bus Voltage	VDC	340

(1) Performance is dependent upon heat sink configuration, system cooling conditions, and ambient temperature
(2) Values shown @ 100°C rise above a 25 °C ambient temperature, with motor mounted to the specified aluminum heat sink
(3) Peak force assumes correct rms current, consult Aerotech
(4) Force Constant and Motor Constant specified at stall
(5) All performance and electrical specifications +/- 10%
(6) Maximum winding temperature is 125 °C
(7) Ambient operating temperature range: 0 °C - 25 °C, consult Aerotech for performance in elevated ambient temperatures
(8) All Aerotech amplifiers are rated Apk; use torque constant in N-m / Apk when sizing

3.3. Load Capability

The VascuLathe®-ACS is designed for tubular manufacturing applications. With this in mind, the tubes loaded into the collet chuck of the rotary axis must fall within the maximum load parameters outlined in Table 3-2.

NOTE: Maximum loads are mutually exclusive; loading limits are due to the collet chuck mechanism. Contact Aerotech directly if part requirements exceed specifications.

If the VascuLathe®-ACS is configured for wet cut, it will have a rotary union attached to the end of the rotary shaft (Figure 3-1). A 1/2 NPT tapped hole is provided on the end of the rotary union shaft to allow for connecting a pressure vessel or extension tube. To prevent damage or performance degradation of the stage, the unsupported length and weight of the attached pressure vessel is limited.

NOTE: Aerotech recommends the following limitations on the size and weight of an unsupported pressure vessel:

Length past end of rotary union (L): <250 mm
Moment about end of rotary union (M): <2.0 N-m

If these limits are exceeded, it is recommended that an external steady-rest or support be implemented.

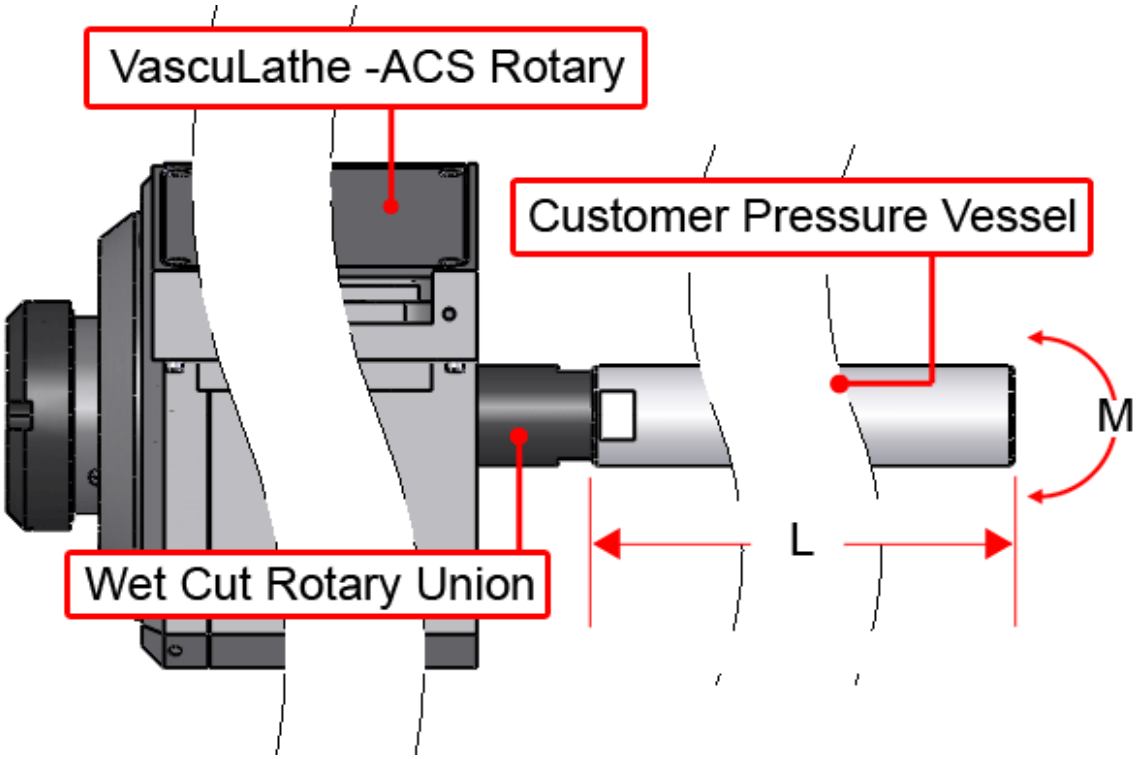


Figure 3-1: VascuLathe®-ACS Wet Cut Rotary Union Location

Chapter 4: Maintenance

This chapter will cover information about component maintenance and replacement, intervals between lubrications, detail the lubrication and inspection process, and cover which lubricants are recommended for use.

DANGER: To minimize the possibility of bodily injury or death, disconnect all electrical power prior to making any mechanical adjustments.

Linear

The VascuLathe®-ACS linear bearing area must be kept free of foreign matter and moisture; otherwise the performance and life expectancy of the stage will be reduced. Always operate the stage with all covers and seals in place to help keep contaminants out.

Rotary

Although the VascuLathe®-ACS rotary axis is designed to be low in maintenance, there are a few items that may require preventative maintenance during the lifetime of the stage. This chapter will detail the lubrication, inspection, and replacement process of various components.

WARNING: Failure to follow the maintenance procedures outlined in this section will result in voiding stage warranty.

NOTE: For the wet cut option, it is recommended that the rotary seal be replaced before 1000 hours of service. Failure to follow the maintenance procedures outlined in Section 4.3.3. Wet Cut Rotary Union Seal Replacement will result in voiding of warranty.

4.1. Service and Inspection Schedule

Linear

Lubricant inspection and replenishment in VascuLathe®-ACS series stages depends on conditions such as duty cycle, speed, and the environment. An inspection interval of once every few months is recommended until a trend develops for the application. Longer or shorter intervals may be required to maintain the film of lubricant on the bearing surfaces. In general, it is recommended that stages operating in a clean environment be lubricated annually. For stages operating under conditions involving excessive debris, lubrication every six months is recommended.

Rotary

Seal inspection and replacement in VascuLathe®-ACS rotary stages depends on conditions such as duty cycle, speed, and the environment. A frequent inspection interval is recommended until a trend develops for the application. As part of this inspection interval, the seals should be examined for excessive air or water leakage. The application will determine the required replacement interval for the seals. The bearings, motor, and encoder for the VascuLathe®-ACS series require no preventative maintenance.

4.2. Lubrication and Cleaning

Linear

The linear bearings of the VascuLathe®-ACS are greased with Dow Corning BR-2. Do not mix lubricants due to potential incompatibilities.

If a solvent is necessary for cleaning the stage, it is recommended that isopropyl rubbing alcohol be used. Harsher solvents, such as acetone, may damage the plastic and rubber seals on the linear bearing trucks.

Refer to Section 4.5. Linear Lubrication and Cleaning Process for the correct cleaning and lubrication procedure.

Rotary

O-rings and collet piston seals should be lubricated with Parker O-Lube lubricant or an equivalent o-ring lubricant.

Any metal parts may be cleaned with either acetone or isopropyl alcohol. Seals and o-rings may be wiped with a small amount of isopropyl alcohol if necessary.

WARNING: Acetone should never be used to clean the o-rings or seals.

4.2.1. Collet & Collet Chuck Lubrication and Cleaning

WARNING: Failure to lubricate and clean the collet interface surfaces will cause premature failure and wear that may void the warranty.

For the collet chuck and collet to operate properly, preventative maintenance and regular cleaning is required.

Before inserting any collet into the chuck, clean the chuck taper and the collet with acetone or isopropyl alcohol with a lint-free cloth or rag. If required, compressed air can be used to clean out the collet grooves. Inspect the collet and the chuck interface surfaces to be sure no wear marks are present. If wear or fret marks [copper-colored oxide marks] are present, the taper can be lightly polished with a fine-grit crocus cloth. The goal is to clean the surface of the taper and not to remove an excessive amount of material. If the wear marks are large, or excessive polishing is required to remove these marks, the taper and the collet may need to be replaced. Contact Aerotech Customer Service for more information.

After inspection and cleaning, grease the chuck taper and collet taper with a small amount of lubricant and insert the collet. Table 4-1 shows the lubricants recommended by Aerotech.

Finally grease the chuck taper and collet taper with a small amount of lubricant and insert the collet.

Table 4-1: Recommended Lubricants

Vender	Product	Item #	Description
Henkel Technologies	Loctite	80209	Silver Grade Anti-Seize
Henkel Technologies	Loctite	51168	Food Grade Anti-Seize
Jet Lube	White Knight	16404	Food Grade Anti-Seize

Lubricant inspection and replenishment depends on conditions such as collet chuck duty cycle and the machining environment. An inspection interval of once every 8-hours is recommended until a trend develops for the application. Longer or shorter intervals may be required to maintain a film of lubricant on the collet taper. It is also recommended that every time a collet is removed, the collet and the chuck interface surfaces are cleaned, inspected, and greased.

4.3. Seal Replacement

4.3.1. Piston Seal Change Procedure

The seals on the collet piston may be replaced if a leak or excess wear becomes apparent. Figure 4-1 shows an exploded view of the assembly and includes all parts involved in the process. The procedure to change the seals is as follows.

DANGER: To minimize the possibility of bodily injury or death, disconnect all electrical power prior to making any mechanical adjustments.

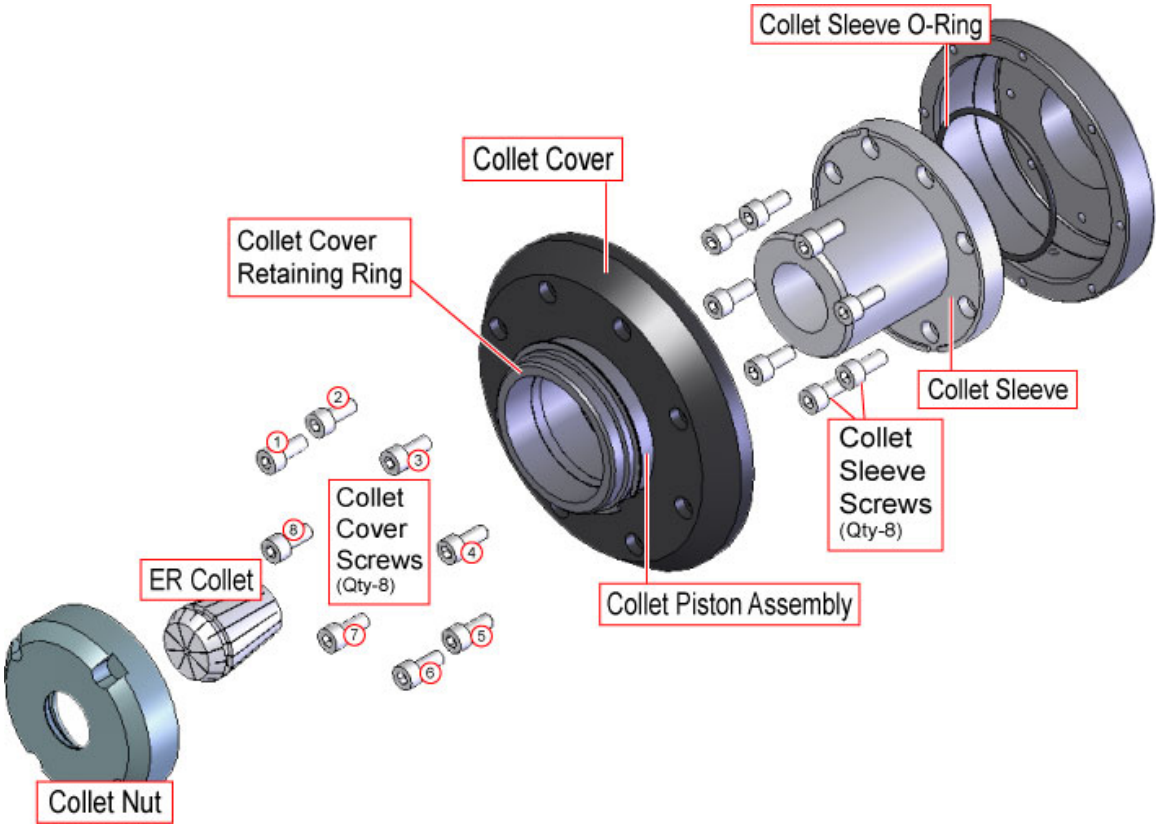


Figure 4-1: Piston Seal Change Exploded View

Step 1: Remove power to the stage.

Step 2: Supply air to the stage in order to release the collet.

Step 3: Remove the collet nut by turning it counterclockwise. Spanner wrenches may be necessary for removal and are available from Aerotech.

Step 4: Remove air pressure from the stage. This will allow the internal springs to relax slightly and ease further disassembly.

DANGER: The collet cover is under tension from internal springs. Removing the collet cover screws incorrectly can result in personal harm and damage to the equipment.

Step 5: Refer to Figure 4-1. Remove every other collet cover screw (i.e., screws 1, 3, 5, and 7). All screws cannot be removed at once, as the cap is under tension from several springs and will be damaged or cause bodily harm if removed without caution.

Step 6: Obtain four M3 x 0.7 x 12 mm long socket head cap screws and thread them into the holes where the previous screws were removed. Tighten each one until it bottoms out in its hole.

Step 7: Loosen the four remaining collet cover screws, 1/4 turn at a time. Loosen the screws in a cross pattern (i.e., loosen screw number 2, then screw number 6, then screw number 8, then screw number 4, then return to screw number 2). Repeat this process until the longer screws are supporting the tension of the springs entirely. It is then safe to remove the remaining collet cover screws completely.

Step 8: Using the same method as in Step 7, remove the longer screws until the spring tension is completely relieved.

Step 9: Carefully slide the collet piston assembly out from its housing. Use caution not to tilt the piston assembly in its housing as this could cause damage to the housing, seals, or piston.

Step 10: It is now safe to remove the collet cover retaining ring. This can be done with a flat-head screwdriver or a pair of needle nosed pliers.

Step 11: Remove the collet cover and the springs from the collet piston.

Step 12: There are two seals on the piston itself. One is an external seal that seals the piston against its housing; the other is an internal seal that seals the piston against the collet sleeve. To remove the seals, carefully pry them out of their housings with a small screwdriver or pick. Use caution not to scratch the surface of the piston.

Step 13: Thoroughly clean seal mounting surfaces, the chamfers, and all surfaces that the new seals may come in contact with. Even small particles or debris can damage the seals during installation.

Step 14: Lubricate the new seals with o-ring lubricant as specified in Section 4.2. Lubrication and Cleaning

Step 15: Press the new seals over the chamfer and into their respective grooves. Be sure to align the seals such that the open end (when looking at a cross section) is facing away from the collet, as shown in Figure 4-3. The direction of the seal is extremely important in sealing the piston. Make sure that the seals sit into their mounting grooves by running a fingernail around the edge. If the seal is tilted or twisted slightly its function will be severely compromised.

Step 16: Reinstall the springs.

Step 17: Place the collet cover over the piston and reinstall the collet cover retaining ring.

Step 18: Reinstall the collet piston assembly into its housing. There are chamfers to help guide the piston into place, but use caution not to twist or damage the seals. It is recommended that a small amount of o-ring lubricant be used.

Step 19: Installation of the collet cover is the reverse of removal. Begin by inserting the four 12 mm long screws in every other hole and tightening until they bottom out in their respective holes. Then install the shorter original screws into the remaining holes and tighten in a cross pattern until the collet cover is seated against the shaft. Install the remaining four original screws. Torque all screws to a final torque of 1.8 to 2.0 N-m (16 to 18 in-lbs).

Step 20: Apply air pressure to the stage in order to install the collet.

Step 21: Install the new collet as described in Section 2.5.1. Collet Installation and Removal Procedure

Step 22: Restore the air supply to the original settings and restore power to the stage.

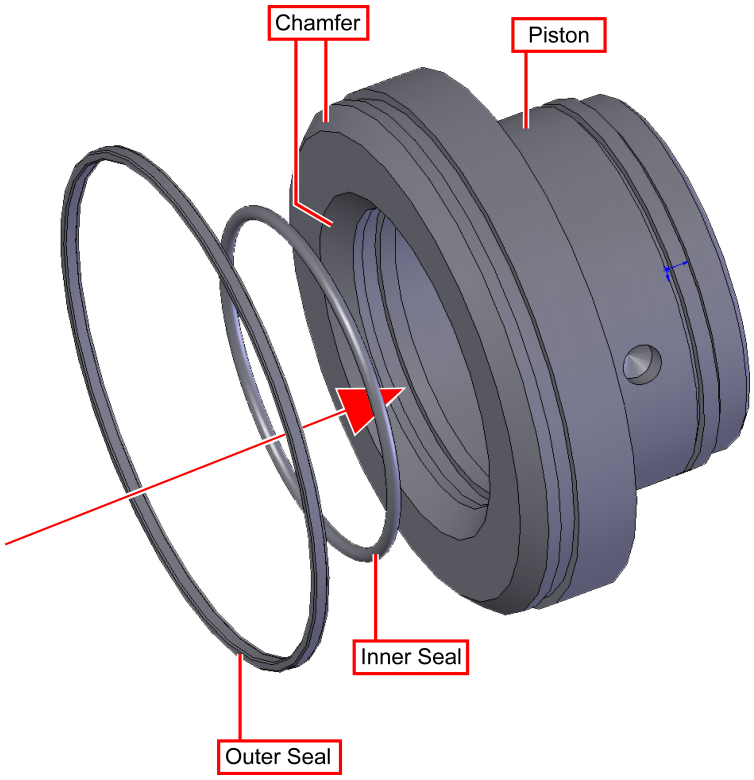


Figure 4-2: Piston Seal Installation Procedure

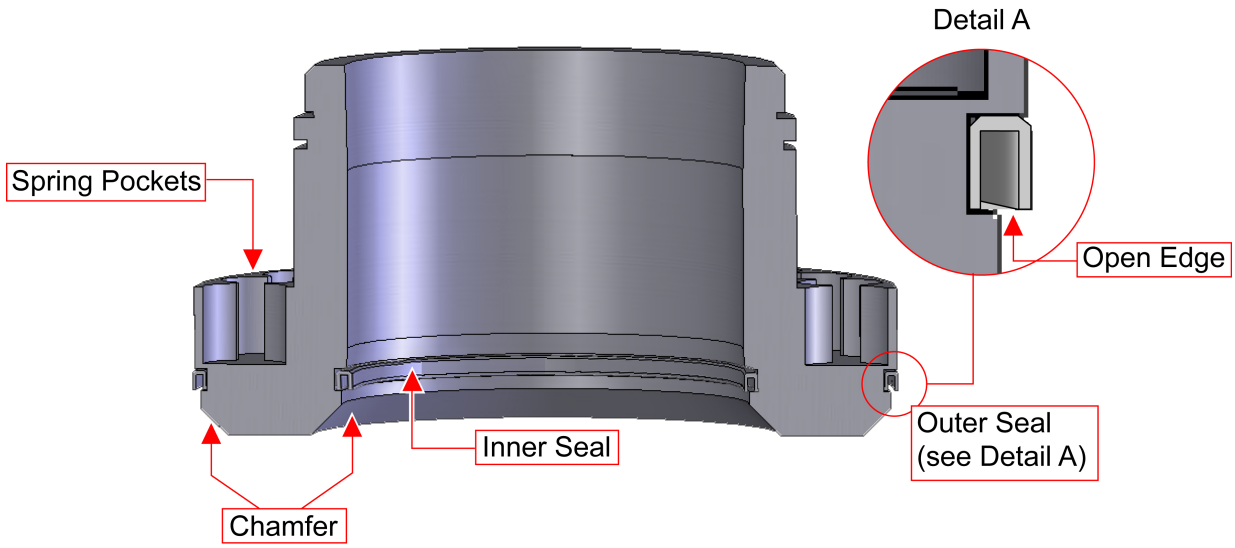


Figure 4-3: Cross-Section View of Piston Showing Seal Orientation

4.3.2. Ringseal O-Ring Replacement

During the lifetime of the stage, it may be necessary to change the ringseal o-rings. A typical ringseal insert is shown in Figure 4-4. The ringseal screws into the center of the shaft, from the front of the stage and is replaced by the following steps:

DANGER: To minimize the possibility of bodily injury or death, disconnect all electrical power prior to making any mechanical adjustments.

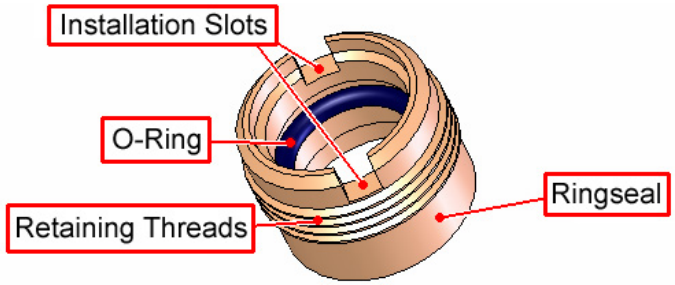


Figure 4-4: Typical Ringseal

Step 1: Remove power to the stage.

Step 2: Release the collet. Since the collet holder is in the normally closed position, this will require air pressure supplied to the air inlet.

Step 3: Once the collet has been released, unscrew the collet nut. If necessary, use a spanner wrench available from Aerotech.

Step 4: With the collet and collet nut removed, the ringseal will now be exposed. Using a tool dimensioned in Figure 4-5, unscrew the ringseal from the collet sleeve.

Step 5: Remove the o-ring on the ringseal itself, and replace it with a properly lubricated new item. The second o-ring is within the collet sleeve (shown in Figure 4-6. A long pick or thin screwdriver will be necessary to remove the o-ring and replace it.

Step 6: Re-insert the ringseal into the inner collet housing and tighten it into position.

Step 7: Replace collet and collet nut

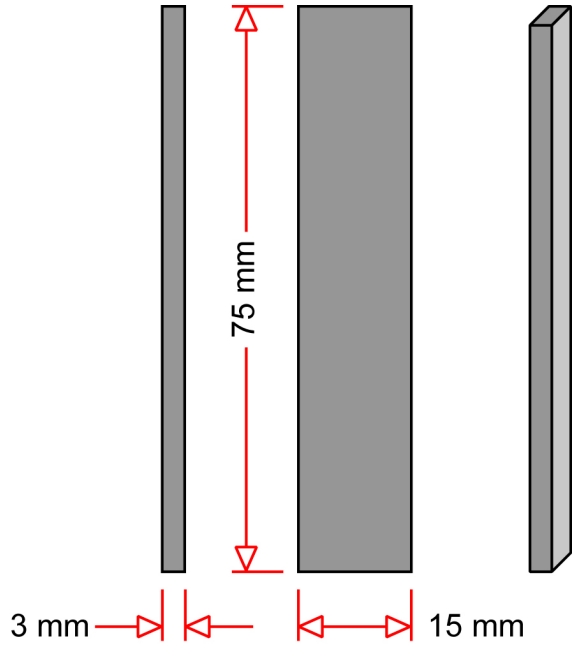


Figure 4-5: Ringseal Removal Tool Dimensions

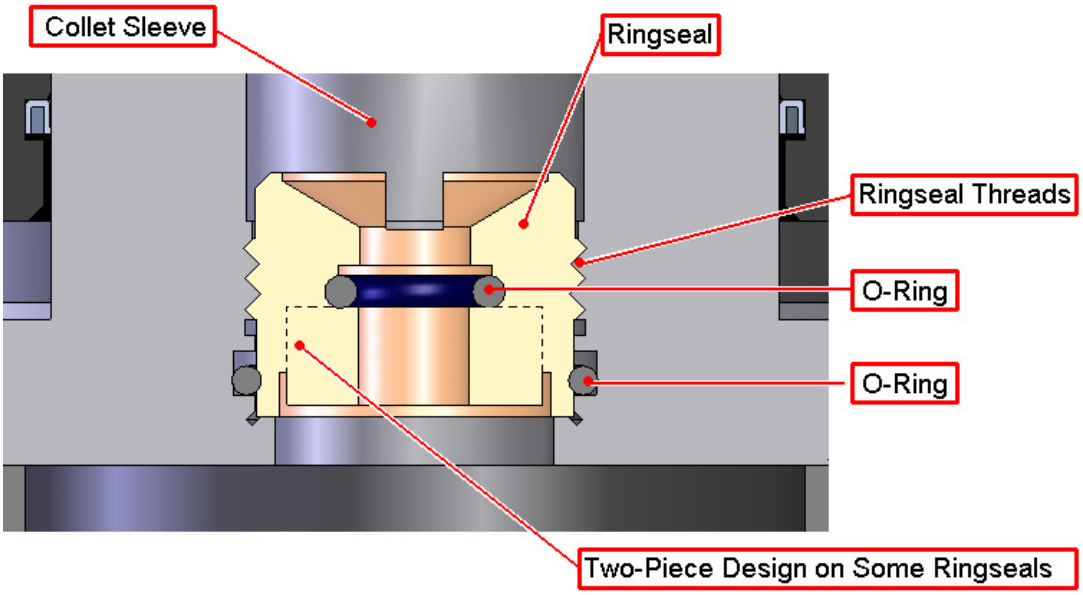


Figure 4-6: Cross-Section View of Ringseal Showing O-Ring

4.3.3. Wet Cut Rotary Union Seal Replacement

The rotary seal in the wet cut rotary union requires periodic replacement. Contact Aerotech for obtaining appropriate replacement seals. Figure 4-7 shows a cross section of the rotary union assembly.

DANGER: The wet cut rotary union seal should be replaced and relubricated at a minimum of every 1000 hours of stage operation.
For heavy use or three shift operation: this corresponds to replacement every month.
For lighter use or single shift operation: this corresponds to replacement every three months.

WARNING: Failure to follow the maintenance procedures outlined in this section will result in voiding stage warranty.

DANGER: To minimize the possibility of bodily injury or death, disconnect all electrical power prior to making any mechanical adjustments.

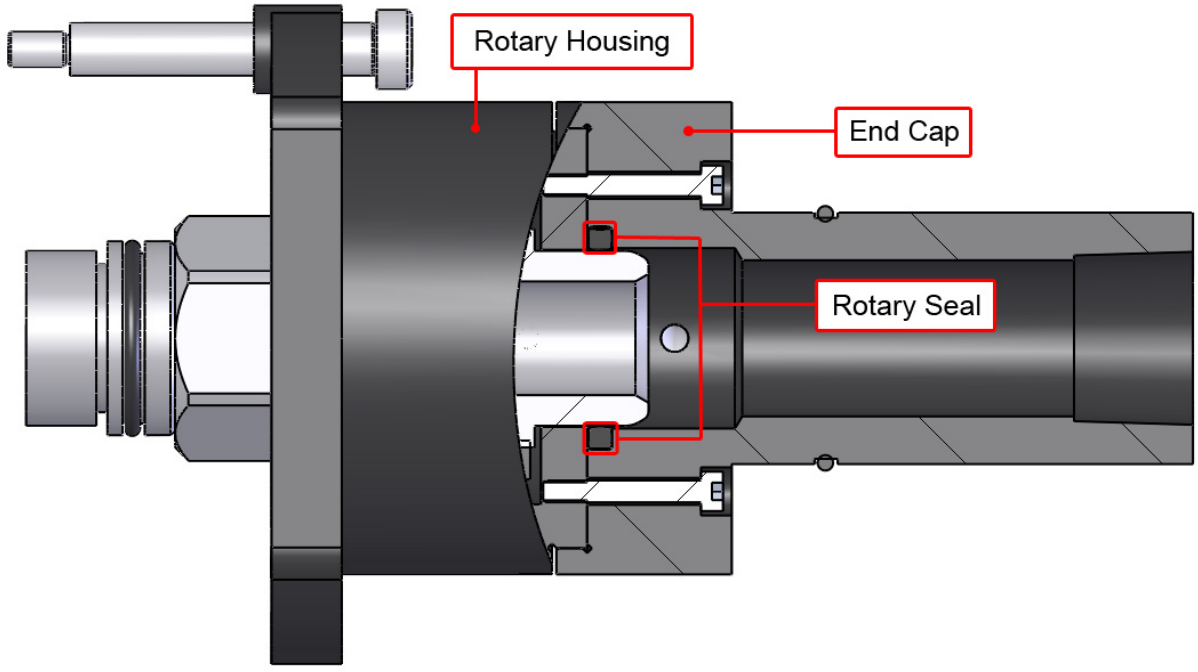


Figure 4-7: Cross-Section View of Wet Cut Rotary Union

Step 1: Remove power to the stage.

Step 2: To access the rotary union assembly, remove rear carriage cover and top carriage cover located on the backside of the carriage (see Figure 4-8).

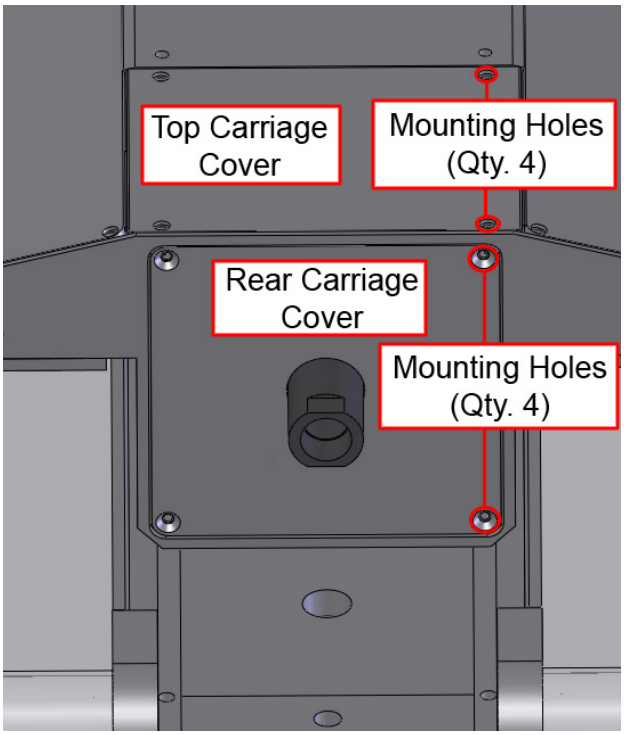


Figure 4-8: Carriage Cover Removal

Step 3: Remove the six end cap mounting screws from the rear end of the rotary union (see Figure 4-9).

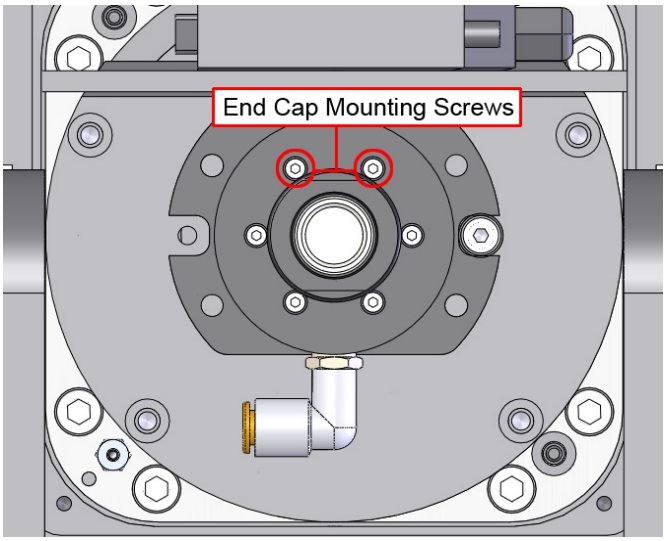


Figure 4-9: End Cap Mounting Screw Location

Step 4: Carefully pull the end cap off of the rotary union housing. The rotary seal and rotary union shaft will now be exposed. Figure 4-10 shows an exploded view of the seal assembly.

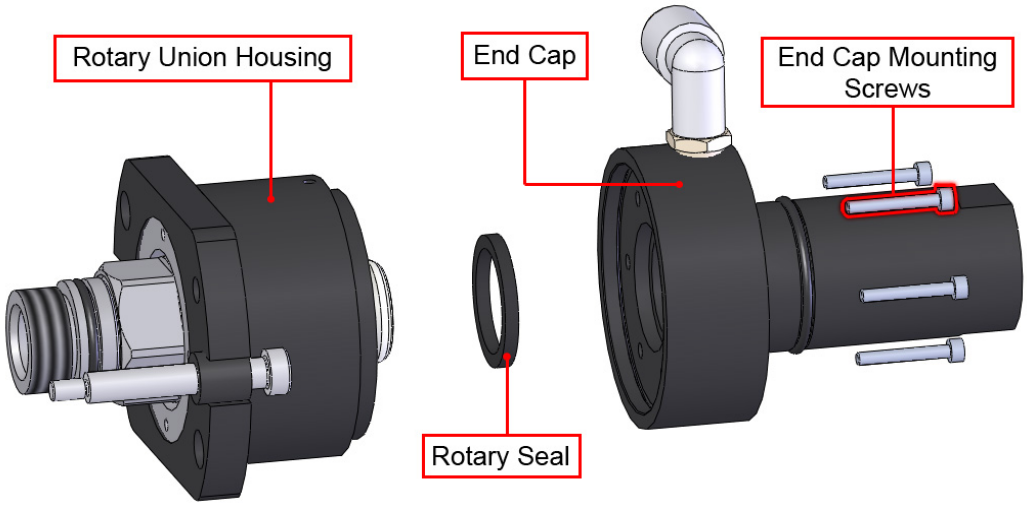


Figure 4-10: Rotary Seal Installation / Removal

Step 5: Pry the rotary seal from its housing using care not to damage the sealing surfaces (see Figure 4-11). Inspect the shaft and seal surface for scratches or nicks (see Figure 4-12). Small wear marks are normal. If the shaft and seal retainer sealing surface are undamaged, clean both the shaft and seal assembly surfaces with a lint-free rag and isopropyl alcohol.

If the shaft or sealing surface is scratched (you can feel it with your fingernail), contact Aerotech customer service.

If advised to remove the rotary union, see Section 4.4. Wet Cut Rotary Union Removal for instructions.

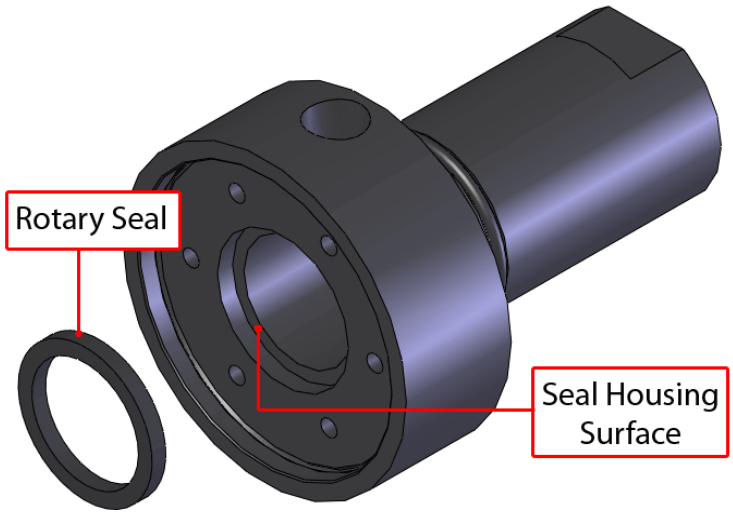


Figure 4-11: Seal Housing Location

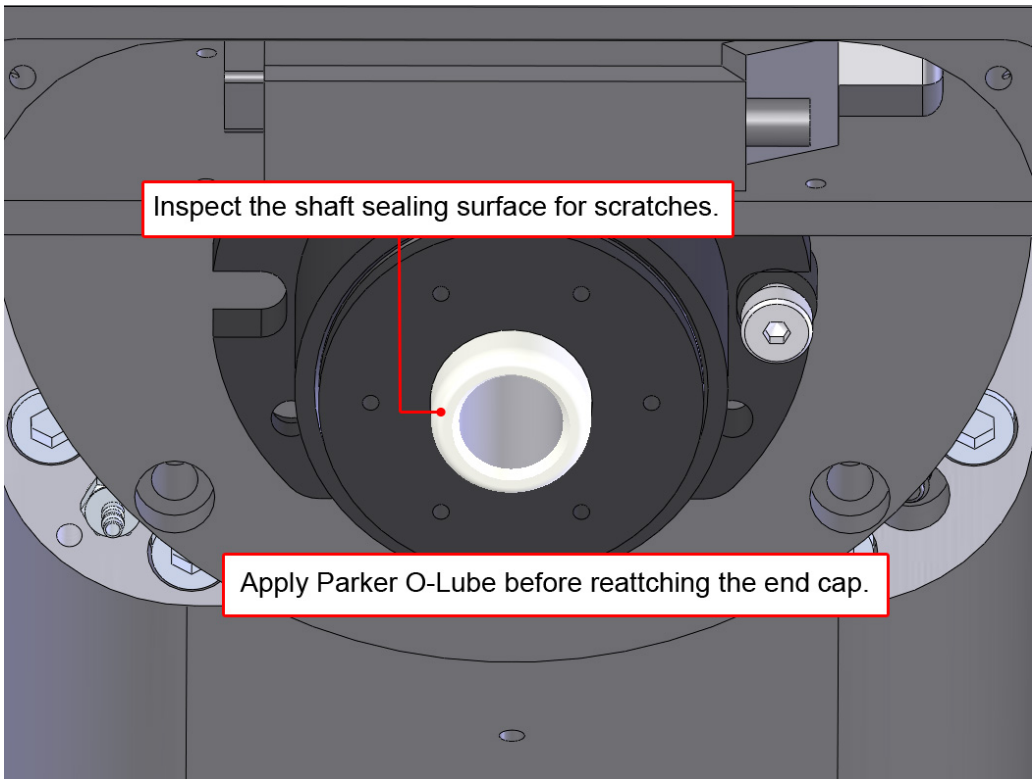


Figure 4-12: Wet Cut Rotary Union Shaft Inspection

Step 6: Lubricate the new seal with a generous amount of Parker O-Lube and press it uniformly into its housing.

Step 7: Apply Parker O-Lube to the exposed end of the rotary union shaft as shown in Figure 4-12.

Step 8: Press the seal assembly back over the rotary union shaft onto the housing. Use care so that damage does not occur to the newly installed seal.

Step 9: Tighten the seal assembly screws and reattach covers.

Step 10: Restore power to the stage.

4.4. Wet Cut Rotary Union Removal

If the rotary union shaft becomes scratched or damaged, it will be necessary for the rotary union to be replaced in order to properly seal the system (refer to Figure 4-13 for a view of the rotary union assembly).

DANGER: To minimize the possibility of bodily injury or death, disconnect all electrical power prior to making any mechanical adjustments.

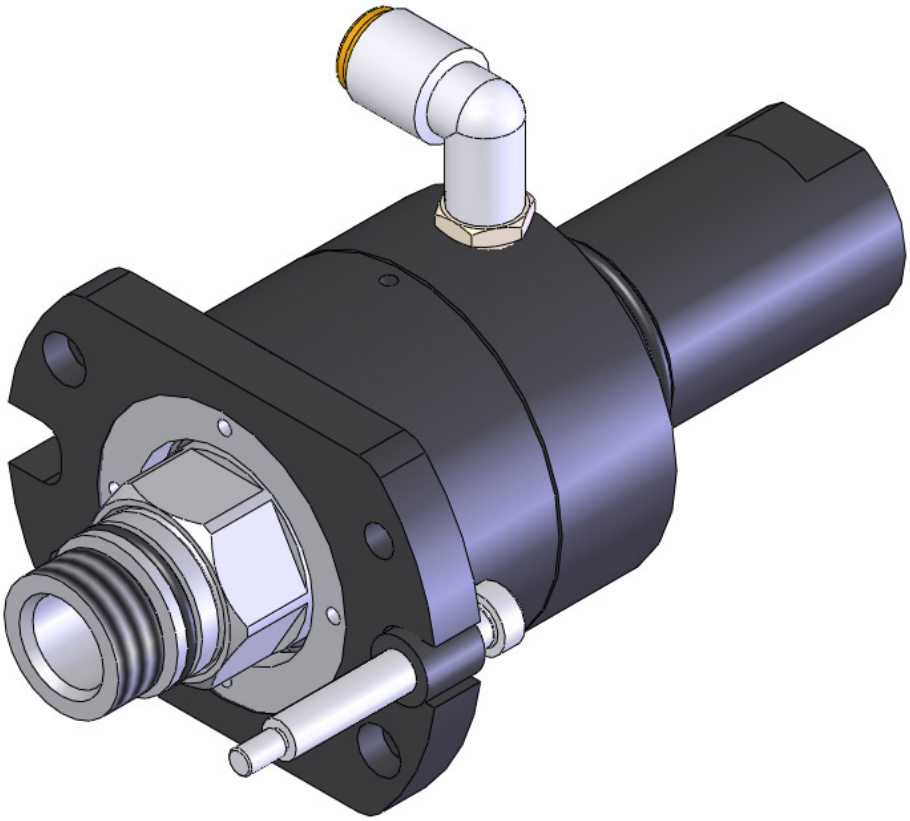


Figure 4-13: Wet Cut Rotary Union

Step 1: Remove power to the stage.

Step 2: Remove the rear carriage cover and top carriage cover located on the backside of the carriage (see Section 4.3.3. Wet Cut Rotary Union Seal Replacement for the removal procedure).

Step 3: Remove the shoulder bolt and bushing (see Figure 4-14).

Step 4: Using a 25 mm wrench on the rotary union nut and a 27 mm wrench on the VascuLathe®-ACS shaft coming in from the top of the carriage, unscrew the rotary union from the VascuLathe®-ACS shaft (see Figure 4-14).

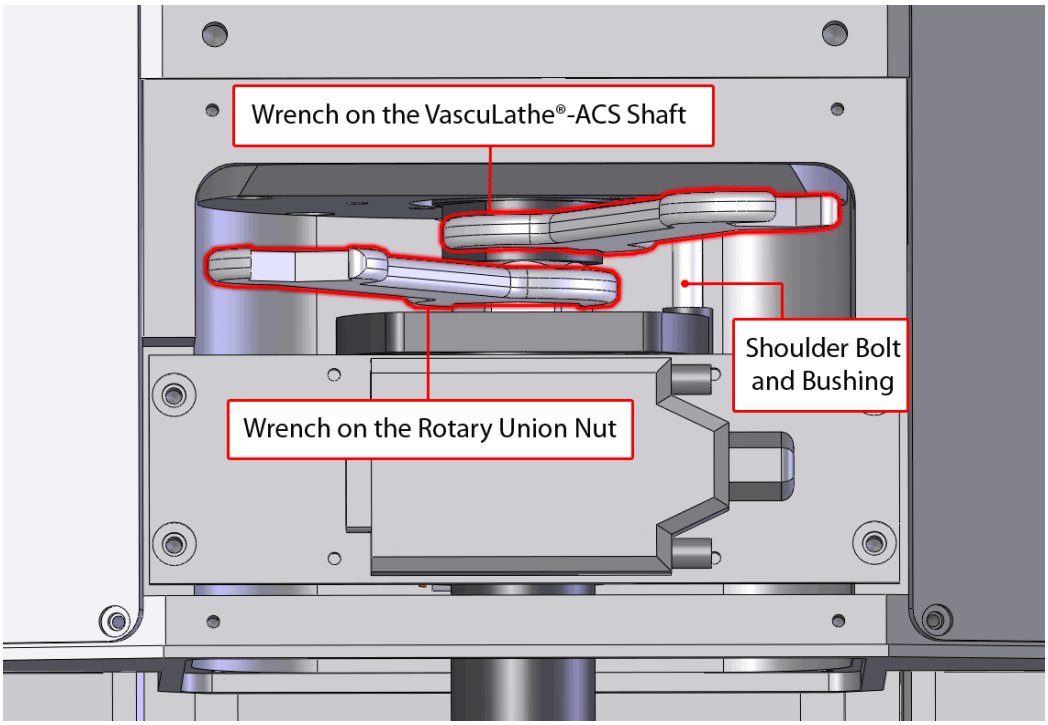


Figure 4-14: Wet Cut Rotary Union Installation

Step 5: Install a new rotary union assembly by attaching it to the rear of the VascuLathe®-ACS shaft. Tighten to 10 ft-lbs.

Step 6: Tighten the shoulder bolt and bushing.

Step 7: Reattach all covers.

Step 8: Restore power to the stage.

4.5. Linear Lubrication and Cleaning Process

The lubrication and cleaning process is outlined in the steps that follow. Before beginning lubrication, refer to Section 4.2. Lubrication and Cleaning for recommended lubricants.

DANGER: To minimize the possibility of bodily injury or death, disconnect all electrical power prior to making any mechanical adjustments.

Step 1: Remove power to the stage.

Step 2: Remove spar belt covers (refer to Section 4.6. Linear Spar Cover Removal).

Step 3: Remove any accumulated dust or debris from both the belts and the belt guide tracks located on the inside and outside spar covers removed in step 2.

Step 4: Remove any accumulated dust or debris from the inside of the assembly.

Step 5: Remove any dirty or dried lubricant from the linear bearing guides. Use a clean, lint-free cloth. A swab soaked in isopropyl alcohol may be used to remove stubborn debris.

Step 6: Apply a thin, continuous film of lubricant to the linear bearing guides. A good quality, natural bristle artist's brush makes an excellent applicator.

Step 7: Using the grease nipple on each linear bearing truck (refer to Figure 4-15), add grease as required.

Step 8: Manually move the stage to the opposite end of travel to work the grease into the linear bearing guides.

Step 9: Repeat steps 3 through 7 for any areas covered by the original table position.

Step 10: Refasten the spar belt covers.

Step 11: Restore power to the stage and drive the stage table back to its original position to redistribute lubricants.

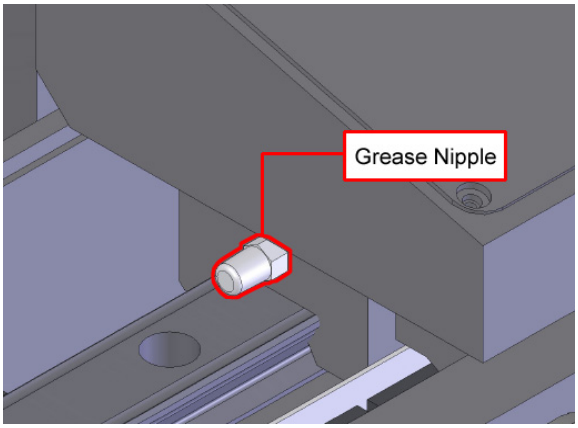


Figure 4-15: Linear Bearing Grease Nipple

4.6. Linear Spar Cover Removal

The procedure outlined below details how to remove the linear spar covers.

Step 1: Remove the inside spar cover as shown below and lean against inside of carriage.

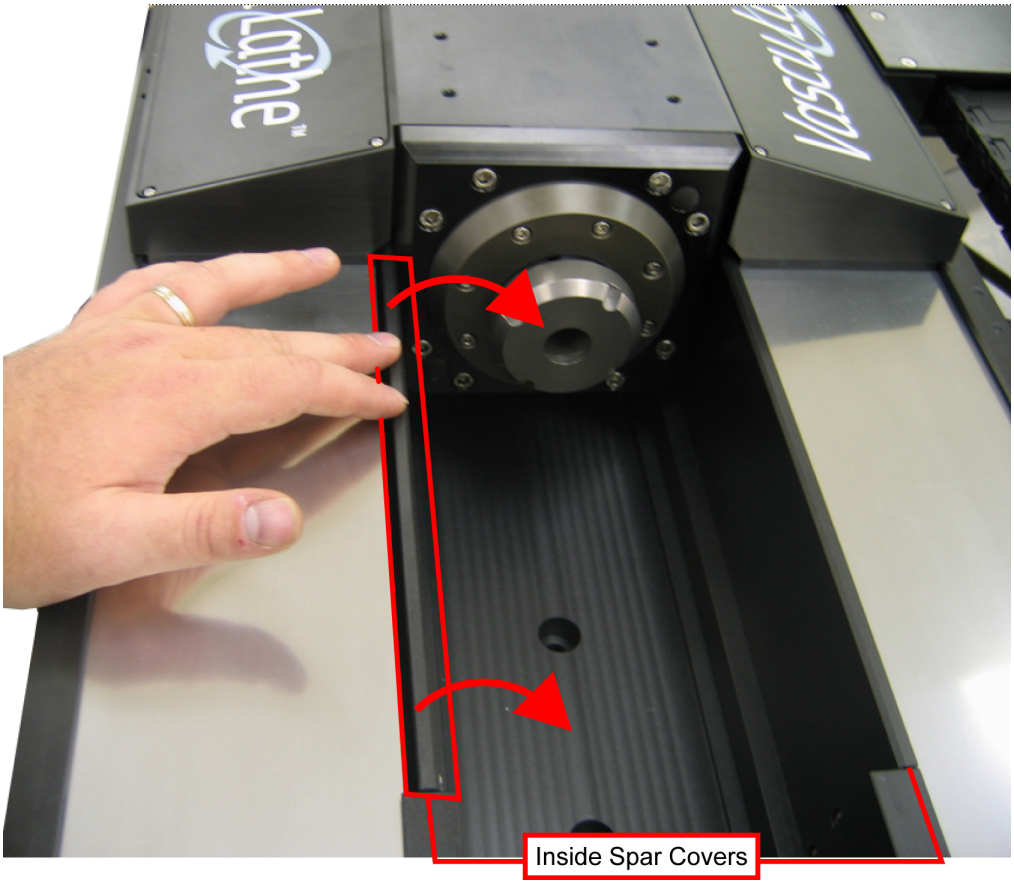


Figure 4-16: Removing the Inside Spar Cover

Step 2: Remove the outer spar cover mounting screws and remove the cover.

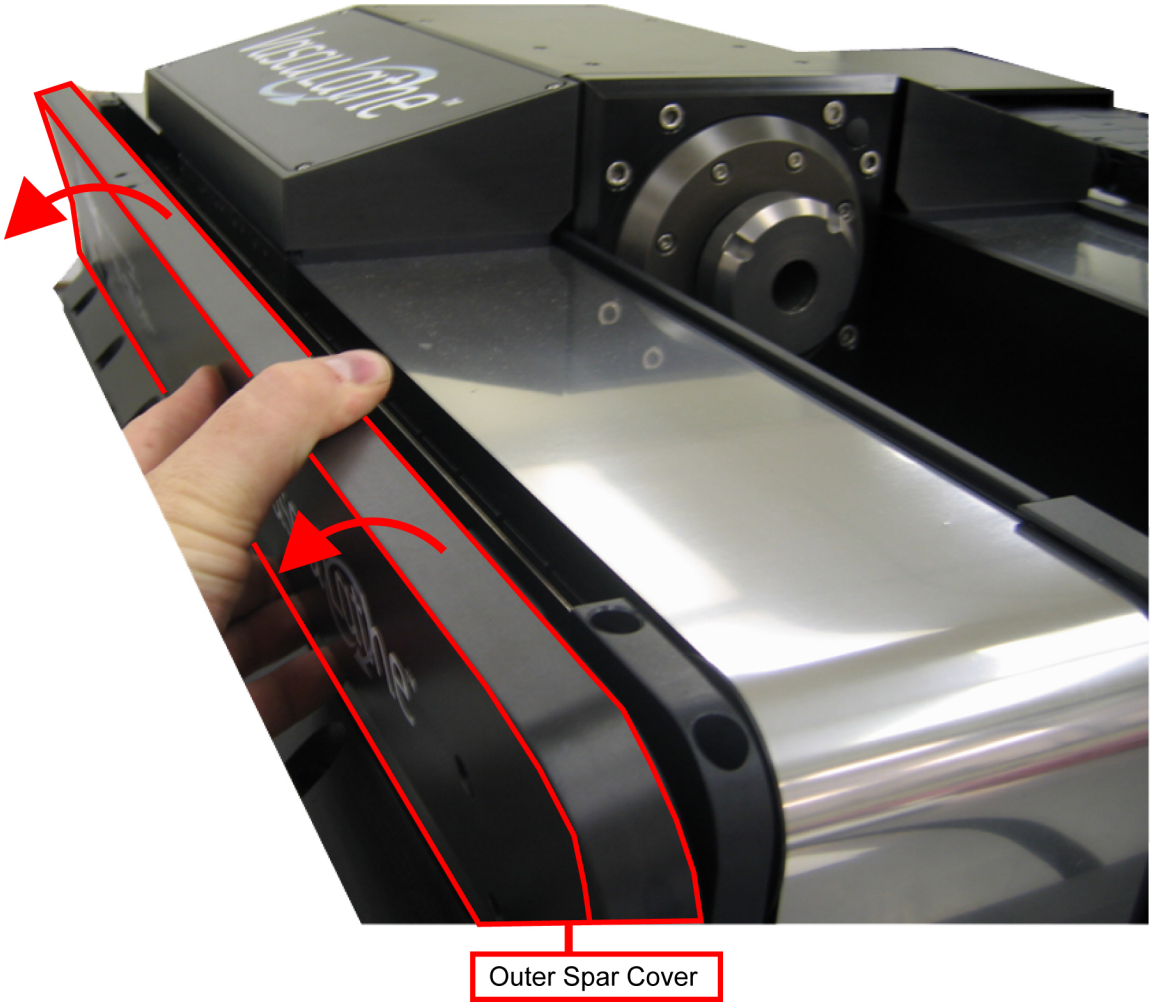


Figure 4-17: Removing the Outer Spar Cover

Step 3: Remove the carriage side cover on the side of the spar cover being serviced.

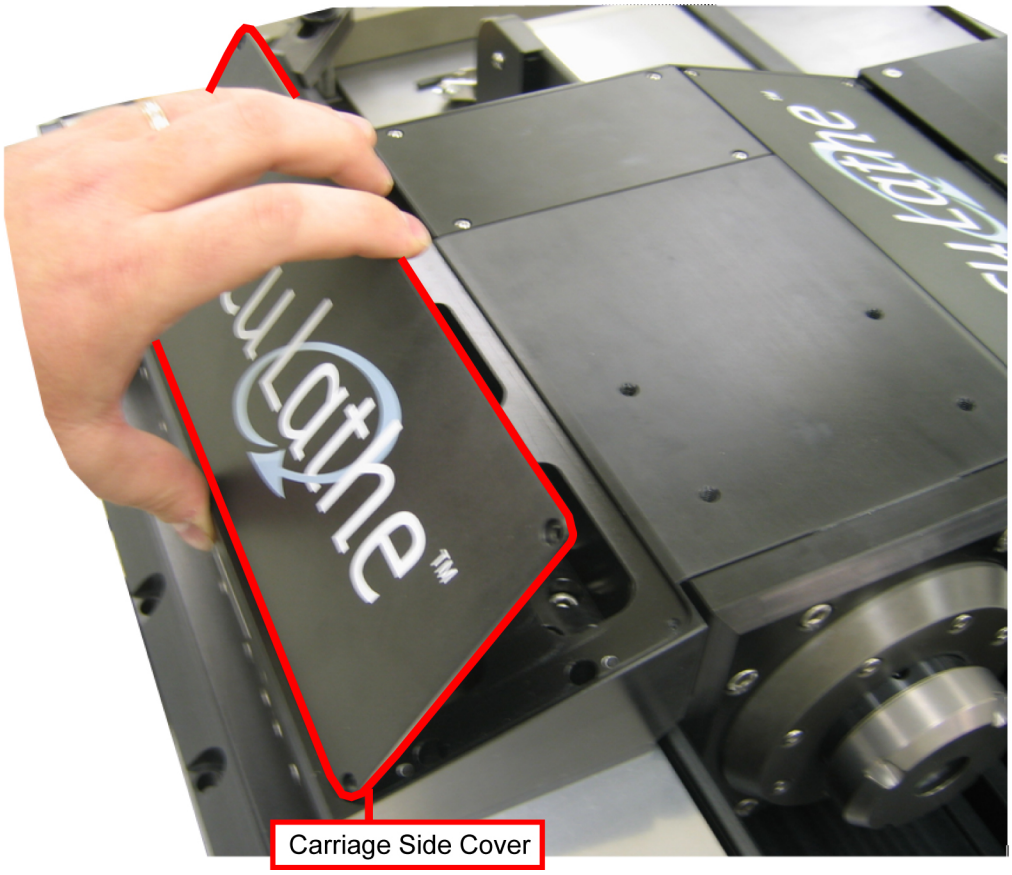


Figure 4-18: Removing the Carriage Side Cover

Step 4: Loosen and remove the (Qty-2) M4 SHCS through the top of the carriage on the front side.

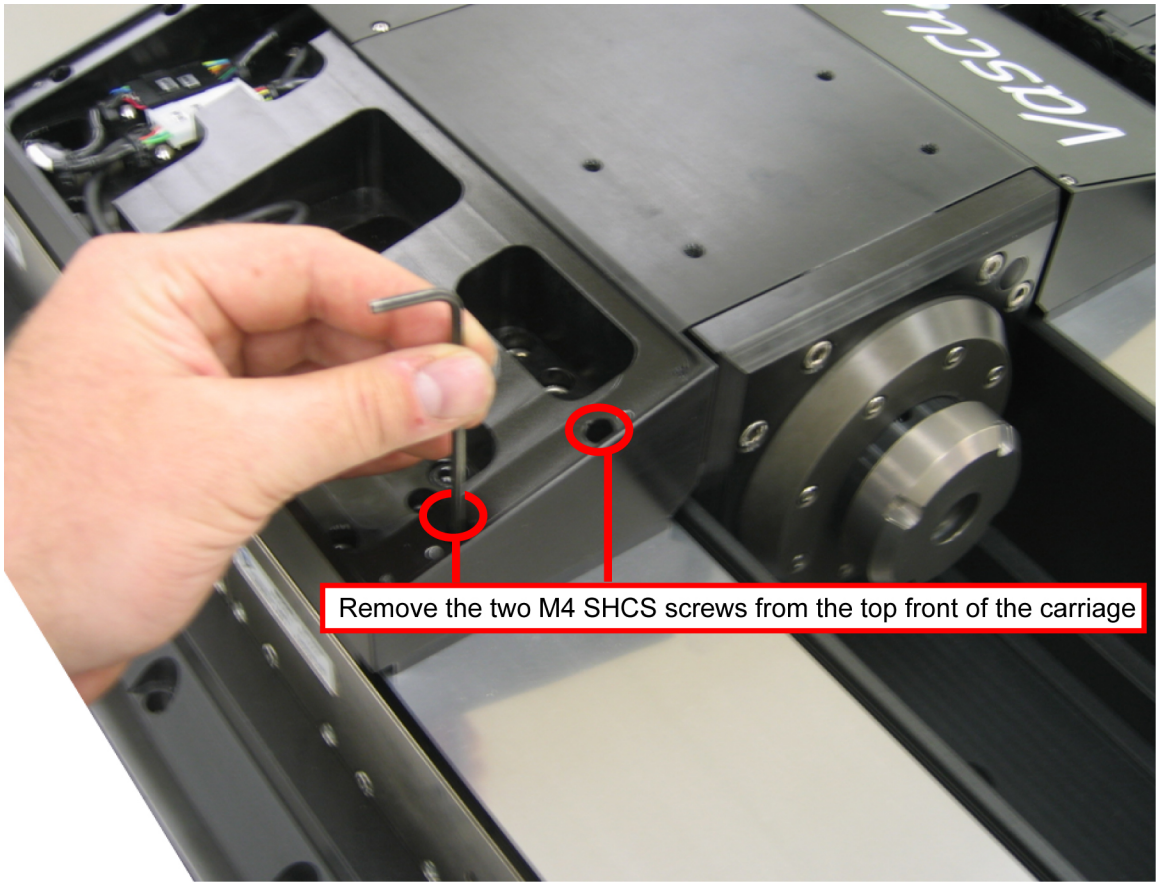


Figure 4-19: Removing M4 MHCS Screws

Step 5: Carefully pull the cover clamps down off of the dowel pins and remove tension from the belt.

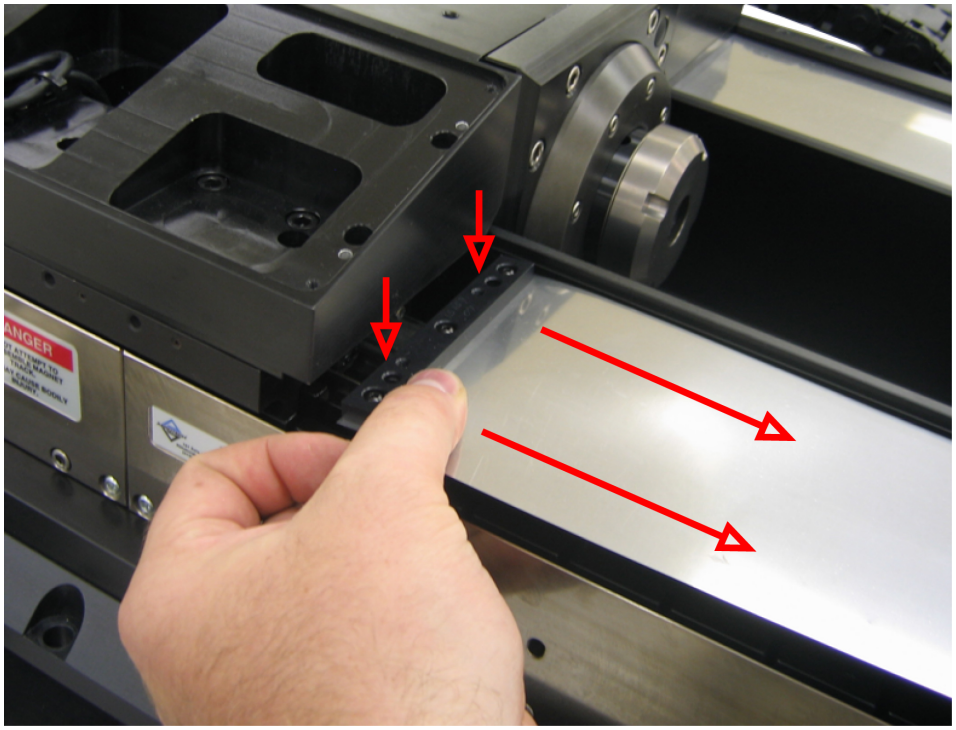


Figure 4-20: Releasing Tension on the Belt

Step 6: Carefully fold each side of the belt back using care not to damage the belt.

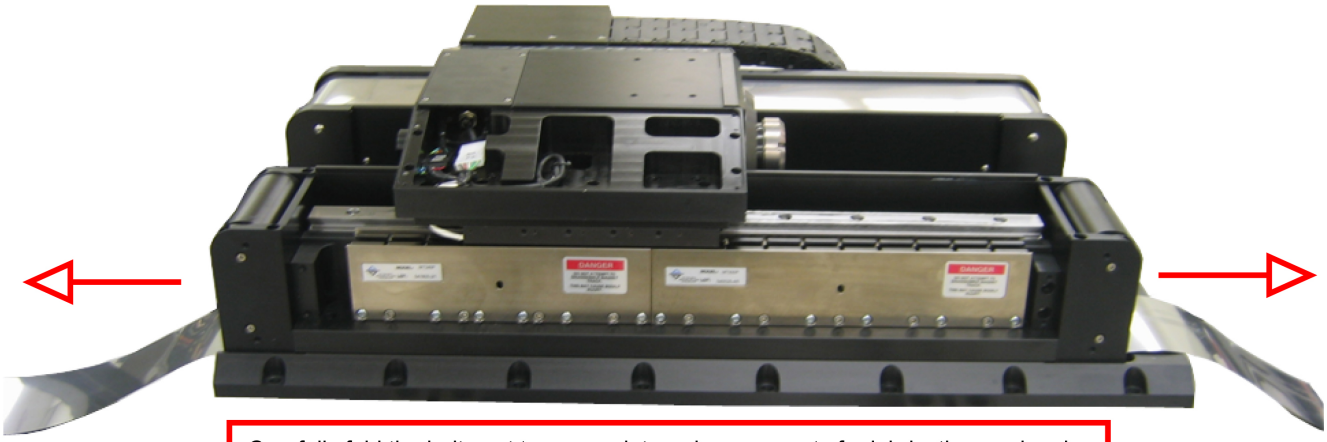


Figure 4-21: VascuLathe®-ACS with Belts Folded Back

Appendix A: Warranty and Field Service

Aerotech, Inc. warrants its products to be free from defects caused by faulty materials or poor workmanship for a minimum period of one year from date of shipment from Aerotech. Aerotech's liability is limited to replacing, repairing or issuing credit, at its option, for any products that are returned by the original purchaser during the warranty period. Aerotech makes no warranty that its products are fit for the use or purpose to which they may be put by the buyer, where or not such use or purpose has been disclosed to Aerotech in specifications or drawings previously or subsequently provided, or whether or not Aerotech's products are specifically designed and/or manufactured for buyer's use or purpose. Aerotech's liability or any claim for loss or damage arising out of the sale, resale or use of any of its products shall in no event exceed the selling price of the unit.

Laser Products

Aerotech, Inc. warrants its laser products to the original purchaser for a minimum period of one year from date of shipment. This warranty covers defects in workmanship and material and is voided for all laser power supplies, plasma tubes and laser systems subject to electrical or physical abuse, tampering (such as opening the housing or removal of the serial tag) or improper operation as determined by Aerotech. This warranty is also voided for failure to comply with Aerotech's return procedures.

Return Procedure

Claims for shipment damage (evident or concealed) must be filed with the carrier by the buyer. Aerotech must be notified within (30) days of shipment of incorrect materials. No product may be returned, whether in warranty or out of warranty, without first obtaining approval from Aerotech. No credit will be given nor repairs made for products returned without such approval. Any returned product(s) must be accompanied by a return authorization number. The return authorization number may be obtained by calling an Aerotech service center. Products must be returned, prepaid, to an Aerotech service center (no C.O.D. or Collect Freight accepted). The status of any product returned later than (30) days after the issuance of a return authorization number will be subject to review.

Returned Product Warranty Determination

After Aerotech's examination, warranty or out-of-warranty status will be determined. If upon Aerotech's examination a warranted defect exists, then the product(s) will be repaired at no charge and shipped, prepaid, back to the buyer. If the buyer desires an airfreight return, the product(s) will be shipped collect. Warranty repairs do not extend the original warranty period.

Returned Product Non-warranty Determination

After Aerotech's examination, the buyer shall be notified of the repair cost. At such time, the buyer must issue a valid purchase order to cover the cost of the repair and freight, or authorize the product(s) to be shipped back as is, at the buyer's expense. Failure to obtain a purchase order number or approval within (30) days of notification will result in the product(s) being returned as is, at the buyer's expense. Repair work is warranted for (90) days from date of shipment. Replacement components are warranted for one year from date of shipment.

Rush Service

At times, the buyer may desire to expedite a repair. Regardless of warranty or out-of-warranty status, the buyer must issue a valid purchase order to cover the added rush service cost. Rush service is subject to Aerotech's approval.

On-site Warranty Repair

If an Aerotech product cannot be made functional by telephone assistance or by sending and having the customer install replacement parts, and cannot be returned to the Aerotech service center for repair, and if Aerotech determines the problem could be warranty-related, then the following policy applies:

Aerotech will provide an on-site field service representative in a reasonable amount of time, provided that the customer issues a valid purchase order to Aerotech covering all transportation and subsistence costs. For warranty field repairs, the customer will not be charged for the cost of labor and material.

If service is rendered at times other than normal work periods, then special service rates apply. If during the on-site repair it is determined the problem is not warranty related, then the terms and conditions stated in the following "On-Site Non-Warranty Repair" section apply.

On-site Non-warranty Repair

If any Aerotech product cannot be made functional by telephone assistance or purchased replacement parts, and cannot be returned to the Aerotech service center for repair, then the following field service policy applies:

Aerotech will provide an on-site field service representative in a reasonable amount of time, provided that the customer issues a valid purchase order to Aerotech covering all transportation and subsistence costs and the prevailing labor cost, including travel time, necessary to complete the repair.

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Appendix B: Technical Changes

Table B-1: Current Changes (1.05.00)

Section(s) Affected	General Information
All	General Edit (non-technical)

Table B-2: Archived Changes

Revision	Section(s) Affected	General Information
1.00.00	--	New manual
1.01.00	Section 1.3. Model Numbers Section 2.5.1. Collet Installation and Removal Procedure Section 3.2. Basic Specifications Section 3.3. Load Capability Section 4.3.3. Wet Cut Rotary Union Seal Replacement Section 4.4. Wet Cut Rotary Union Removal	Updated model numbering scheme Updated collet installation procedure Updated basic specifications Added pressure vessel limitations Changes for wet cut rotary union seal replacement Added wet cut rotary union removal section
1.02.00	Section 2.11. Wet Cut Fluid Requirements Section 1.4. Dimensions All	Added wet cut fluid requirements section Added dimensions section Changed page numbering from section based to absolute
1.03.00	Section 4.2.1. Collet & Collet Chuck Lubrication and Cleaning	Changed collet and collet chuck lubrication and cleaning instructions
1.04.00	Section 1.6. EC Declaration of Incorporation	Added section
	Section 3.1. Environmental Specifications	Added section
	Chapter 2: Installation, Section 2.1. Unpacking and Handling the Stage, Section 2.3. Securing the Stage to the Mounting Surface, Section 2.9. Electrical Installation, and Section 1.5. Safety Procedures and Warnings	Added safety information and warnings
	Section 3.2. Basic Specifications	Added motor specifications

Index

Reader's Comments

VascuLathe®-ACS Series Manual
P/N: EDS116, December 27, 2011
Revision 1.05.00

Is this manual

	YES	NO
Adequate to the subject		
Well organized		
Clearly presented		
Well illustrated		

How do you use this document in your job? Does it meet your needs? What improvements, if any, would you like to see? Please be specific or cite examples.

	Stage/Product Details			
Model #			Title	
Serial #			Company Name	
Date Shipped			Address	
Customer Order #				
Aerotech Subsidiary Order #			Email	

Mail your comments to:	**Fax to:**
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