



ASR1300 Rotary Stage Hardware Manual

Revision: 1.01.00



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Safety Procedures and Warnings

This manual tells you how to carefully and correctly use and operate the ASR1300. Read all parts of this manual before you install or operate the ASR1300 or before you do maintenance to your system. To prevent injury to you and damage to the equipment, obey the precautions in this manual. The precautions that follow apply when you see a Danger or Warning symbol in this manual. If you do not obey these precautions, injury to you or damage to the equipment can occur. If you do not understand the information in this manual, contact Aerotech Global Technical Support.

This product has been designed for light industrial manufacturing or laboratory environments. The protection provided by the equipment could be impaired if the product is used in a manner not specified by the manufacturer.



DANGER: This product contains potentially lethal voltages. To reduce the possibility of electrical shock, bodily injury, or death the following precautions must be followed.

1. Access to the ASR1300 and component parts must be restricted while connected to a power source.
2. Do not connect or disconnect any electrical components or connecting cables while connected to a power source.
3. Disconnect electrical power before servicing equipment.
4. All components must be properly grounded in accordance with local electrical safety requirements.
5. Operator safeguarding requirements must be addressed during final integration of the product.



WARNING: To minimize the possibility of electrical shock, bodily injury or death the following precautions must be followed.

1. Moving parts can cause crushing or shearing injuries. Access to all stage and motor parts must be restricted while connected to a power source.
2. Cables can pose a tripping hazard. Securely mount and position all system cables to avoid potential hazards.
3. Do not expose this product to environments or conditions outside of the listed specifications. Exceeding environmental or operating specifications can cause damage to the equipment.
4. The ASR1300 stage must be mounted securely. Improper mounting can result in injury and damage to the equipment.
5. Use care when moving the ASR1300 stage. Lifting or transporting the ASR1300 stage improperly can result in injury or damage to the ASR1300.
6. If the product is used in a manner not specified by the manufacturer, the protection provided by the product can be impaired and result in damage, shock, injury, or death.
7. Operators must be trained before operating this equipment.
8. All service and maintenance must be performed by qualified personnel.

EU Declaration of Incorporation

Manufacturer: Aerotech, Inc.
101 Zeta Drive
Pittsburgh, PA 15238-2811
USA

herewith declares that the product:
ASR1300 Stage

is intended to be incorporated into machinery to constitute machinery covered by the Directive 2006/42/EC as amended;

and that the following harmonized European standards have been applied:

EN ISO 12100:2010

Safety of machinery - Basic concepts, general principles for design

EN 60204-1:2010

Safety of machinery - Electrical equipment of machines - Part 1: General requirements

and further more declares that

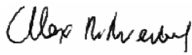
it is not allowed to put the equipment into service until the machinery into which it is to be incorporated or of which it is to be a component has been found and declared to be in conformity with the provisions of the Directive 2006/42/EC and with national implementing legislation, for example, as a 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: Simon Smith, European Director
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Position Engineer Verifying Compliance
Location Pittsburgh, PA
Date 9/3/2019



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Chapter 1: Overview

NOTE: Aerotech continually improves its product offerings; listed options may be superseded at any time. All drawings and illustrations are for reference only and were complete and accurate as of this manual's release. Refer to www.aerotech.com for the most up-to-date information.

Table 1-1: Model Options

ASR1300 Direct Drive Rotary Stage	
Water Cooling (Optional)	
-WC	Motor water cooling
Connector (Required)	
-CN1	4-pin HPD motor and 25-pin D feedback connectors
-CN2	25-pin D motor and 25-pin D feedback connectors
Mounting Plate (Optional)	
-MP1	Mounting plate - no water cooling
-MP2	Mounting plate - with water cooling
Note: ASR1300 stages can be configured to include a mounting plate. The bottom of this mounting plate is precision machined and verified for flatness. If the mounting plate is not selected, a custom mounting option can be attached using the [QTY-4] M5 tapped holes in the bottom of the stage.	
Mounting Orientation (Optional)	
-MT1	Normal mounting
-MT2	Left-side mounting
-MT3	Inverted mounting
-MT4	Right-side mounting
Accessories (to be ordered as a separate line item)	
Collet-D-CLTxx	Levin Type D collet, 0.1 mm to 2.0 mm part diameter sizes available
CGF	Collet and gripper filtration kit

1.1. Environmental Specifications



WARNING: Do not expose this product to environments or conditions outside of the listed specifications. Exceeding environmental or operating specifications can cause damage to the equipment.

Table 1-2: Environmental Specifications

Ambient Temperature	Operating: 16° to 25° C (61° to 77° F) The optimal operating temperature is 20° C \pm 2° C (68° F \pm 4° F). If at any time the operating temperature deviates from 20° C degradation in performance could occur.
	Storage: 0° to 40° C (32° to 104° F) in original shipping packaging
Humidity	Operating: 20% to 60% RH
	Storage: 10% to 70% RH, non-condensing in original packaging. The stage should be packaged with desiccant if it is to be stored for an extended time.
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 system performance. Contact Aerotech for information regarding your specific application.
Protection Rating	The ASR1300 stages have limited protection against dust, but not water. This equates to an ingress protection rating of IP50.
Use	Indoor use only

1.2. Accuracy and Temperature Effects

Extreme temperature changes could cause a decrease in performance or permanent damage to the stage. Aerotech stages are designed for and built in a 20°C (68°F) environment. Any deviation from standard operating temperature will affect stage accuracy. The severity of temperature effects on all stage specifications depends on many different environmental conditions, including how the stage is mounted. Contact the factory for more details.

1.3. Basic Specifications

NOTE: Aerotech continually improves its product offerings; listed options may be superseded at any time. All drawings and illustrations are for reference only and were complete and accurate as of this manual's release. Refer to www.aerotech.com for the most up-to-date information.

Table 1-3: ASR1300 Series Specifications

		ASR1300
Travel		$\pm 360^\circ$ continuous
Accuracy		$\pm 73 \mu\text{rad}$ (± 15 arc sec)
Bidirectional Repeatability		$\pm 10 \mu\text{rad}$ (± 2 arc sec)
Maximum Speed ⁽¹⁾		3000 rpm
Acceleration	Peak ⁽¹⁾	8000 rad/s ²
	Continuous ^(1, 3)	3300 rad/s ²
Maximum Torque (Continuous)		0.7 N·m
Tube Capacity		Up to 2 mm Collet ID
Load Capacity ⁽³⁾	Axial	2.0 kg
	Radial	0.50 kg
	Moment	0.75 N·m
Rotor Inertia (Unloaded)		0.00013 kg·m ²
Stage Mass		2.8 kg
Collet Type		Type D (Louis Levin & Sons TM) Normally-Open
Collet Runout ⁽⁴⁾		<25 μm
Minimum System Air Pressure ⁽⁵⁾		100 psig
Material		Hard Coat Aluminum; Stainless Steel; Polymer
Mean Time Before Failure (MTBF)		10,000 Hours
<p>1. Requires selection of appropriate amplifier with sufficient voltage, current, and encoder frequency. Over 2000 rpm requires an HPe drive or an Npaq.</p> <p>2. Based on steady-state temperature rise of motor by 20°C from ambient with Water Cooling option. Continuous accel limit is 1600 rad/s² without Water Cooling option.</p> <p>3. Maximum loads are mutually exclusive. Loading limits are due to the collet chuck mechanism. Contact Aerotech directly if part load requirement exceeds specifications.</p> <p>4. TIR of precision gage pin in an ultra-precision collet. Measured 3 mm away from collet face at 100 psig applied air pressure for ASR1300.</p> <p>5. Collet chuck mechanism is normally-open. Collet mechanism requires air to close collet chuck. Air supply must be dry (0° F dew point) oil-less air OR 99.99% pure nitrogen. Air or nitrogen must be filtered to 1 micron particle size or better.</p>		

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Chapter 2: Installation



WARNING: ASR1300 installation must be in accordance to instructions provided by this manual and any accompanying documentation. Failure to follow these instructions could result in injury or damage to the equipment.

2.1. Unpacking and Handling the Stage



WARNING: It is the customer's responsibility to safely and carefully lift and move the ASR1300.

- Make sure that all moving parts are secure before moving the ASR1300. Unsecured moving parts may shift and cause bodily injury.
- Improper handling could adversely affect the performance of the ASR1300. Use care when moving the ASR1300.
- Lift only by the base. Do not use the tabletop or cables as lifting points.

NOTE: If any damage has occurred during shipping, report it immediately.

Carefully remove the ASR1300 from its protective shipping container. Gently set the ASR1300 on a smooth, flat, and clean surface.

Before operating the ASR1300, it is important to let it stabilize at room temperature for at least 12 hours. Allowing it 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.

Each ASR1300 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.

2.2. Dimensions

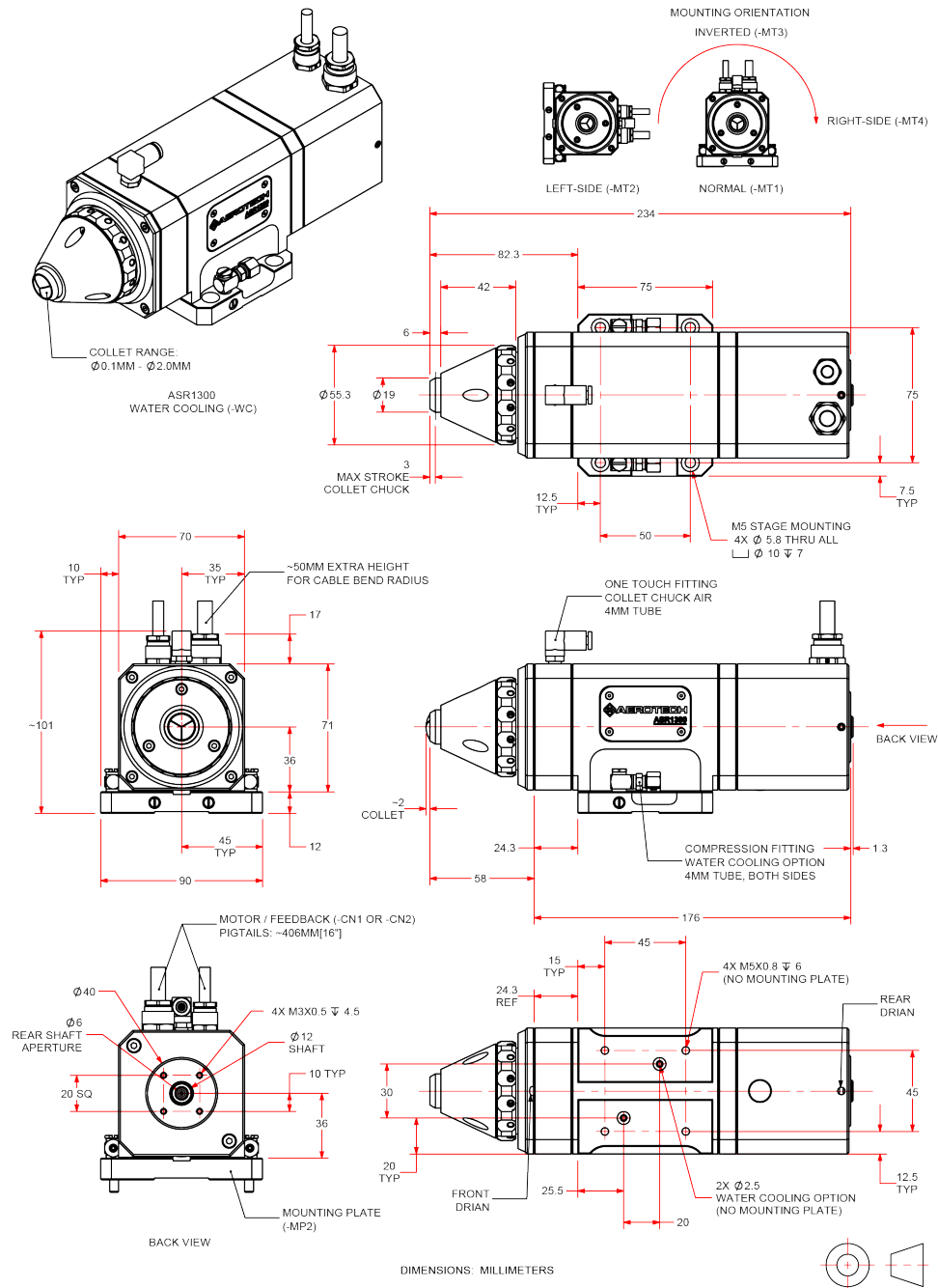


Figure 2-1: ASR1300 Dimensions

2.3. Securing the Stage to the Mounting Surface



WARNING: Do not attempt to manually move the ASR1300 if it is connected to a power source.



WARNING: Make sure that all moving parts are secure before moving the ASR1300. Unsecured moving parts may shift and cause bodily injury.



WARNING: The ASR1300 must be mounted securely. Improper mounting can result in injury and damage to the equipment.

The mounting surface must be flat and have adequate stiffness to achieve the maximum performance from the ASR1300 stage. When it is mounted to a non-flat surface, the stage can be distorted while the mounting screws are tightened. This distortion will decrease overall accuracy. Adjustments to the mounting surface must be done before the stage is secured.

Inspect the mounting surface for dirt or unwanted residue and clean if necessary. Use precision flatstones on the mounting surface to remove any burrs or high spots. Clean the mounting surface with a lint-free cloth and acetone or isopropyl alcohol and allow the cleaning solvent to completely dry. Gently place the stage on the mounting surface.

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

NOTE: The ASR1300 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 ASR1300. Shimming should be avoided if possible. If shimming is required, it should be minimized to retain maximum rigidity of the system.

ASR1300 series stages have a fixed mounting pattern as shown in [Figure 2-2](#) and [Figure 2-3](#).

If a mounting plate is included on the stage, mount using [QTY-4] M5 socket head cap screws ([Figure 2-2](#)). If the stage is configured without a mounting plate, use the [QTY-4] M5 tapped holes on the bottom of the stage to attach an alternative means of mounting ([Figure 2-3](#)). Refer to [Section 2.2. Dimensions](#) for mounting dimensions.

Tightening torque values for the mounting hardware are dependent on the properties of the surface to which the stage is being mounted. Values provided in [Table 2-1](#) are typical values and may not be accurate for your mounting surface. Refer to [Section 2.2.](#) for specific model mounting locations and dimensions.

Table 2-1: Stage to Mounting Surface Hardware

Mounting Hardware	Typical Screw Torque
M5 x 0.8	4.7 N·m

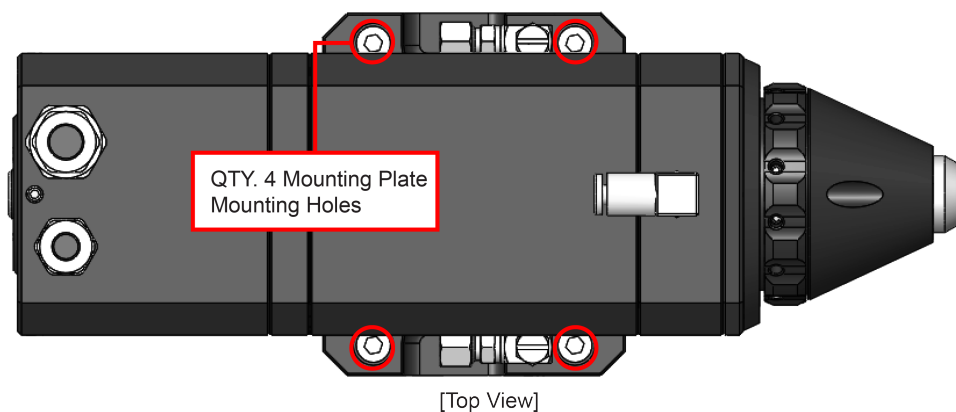


Figure 2-2: ASR1300 Stage Showing Mounting Plate (Top View)

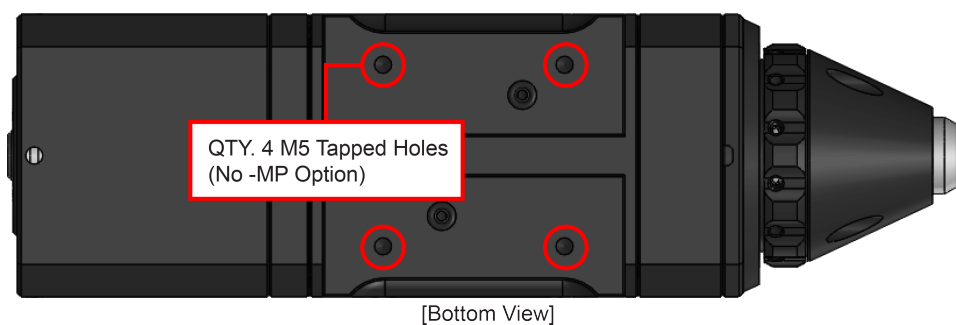


Figure 2-3: ASR1300 Stage Without Mounting Plate (Bottom View)

2.4. Air Requirements

To operate the collet chuck, clean compressed air or nitrogen must be supplied to the stage. The collet chuck's one-touch air-inlet fitting accepts 4 mm polyurethane tubing. For easier air-supply setup, you can purchase pneumatic kits and filter/filter-dryer kits from Aerotech.

The quality of the air supplied to the collet chuck is important to ensure the workpiece is retained properly and to maintain the functionality of the non-contacting rotary union.

- If compressed air is used, it must be filtered to 1.0 micron, dry to 0° F dew point, and oil free.
- If nitrogen is used, it must be 99.99% pure and filtered to 1.0 micron.

The chuck becomes fully closed at approximately 4 bar (60 psig). For standard operation it is recommended to keep the supply pressure at 5.5-7 bar (80-100 psig). Lower pressures, greater than 4 bar (60 psi), can be used but would be application specific. Aerotech recommends using the minimum pressure required for the application that securely clamps the work piece. Lower pressures reduce the possibility of workpiece damage, and ensure the highest system performance.

NOTE: Higher supply pressures will not cause damage to the rotary union.

2.5. General Mechanical Setup

You must test the operation of the stage before any material can be held in the collet to prevent damage to the stage or parts. Document all of the results for future reference. To test the operation of the stage, you must connect an air supply and complete the electrical installation before the collet chuck can be actuated. Refer to [Section 2.4.](#) for air specifications and installation. Refer to [Chapter 3](#) for electrical specifications and installation. Refer to the programming documentation that was supplied with your motion control software for operating guidance.

The stage features a “normally-open”, air-actuated collet chuck. Therefore, the collet chuck will remain open until air pressure is supplied to the stage. Cycle the air supply “on” and “off” to check for proper operation of the collet chuck. The stage requires 60-100 psig to close.

Once the collet chuck has been verified to operate properly, a collet can be installed into the stage (refer to [Section 2.7.](#)). Appropriately sized material can then be inserted in to the collet. The collet chuck should again be checked for proper operation using the same procedures as before. Aerotech recommends turning the air pressure supply to 0 psi using a precision regulator and slowly increasing pressure until the material is clamped in the collet. Only the minimum amount of air pressure which properly secures the material for the application should be used (refer to [Section 2.4.](#)).



WARNING: The size of material should match the collet size and be inserted into the collet at least 2/3 the length of the collet bore. Material that is larger or smaller than the collet or not inserted far enough into the collet will affect system performance, particularly material runout. In worst-case scenarios, the collet could be damaged and have to be replaced.

2.6. Load Capability

The ASR1300 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 in [Section 1.3](#).

NOTE: Maximum loads are mutually exclusive.

2.7. Changing ASR Workholding Devices

ASR1300 stages are equipped with Levin “Type-D” style collets. It is important that only the collets designed for a particular collet holder are used. Contact the factory for more details.

NOTE: Various grip diameters are commonly available and can be interchanged.

2.7.1. Collet Installation and Removal Procedure



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

To Install a Collet:

Step 1: Disable and remove power from the stage

Step 2: Clean the collet chuck taper and collet including the threads

NOTE: Acetone or isopropyl alcohol can be used to clean the metal components.

Step 3: Apply a small amount of anti-seize lubricant to the collet chuck taper ([Section 4.2.1.](#)).

Step 4: Verify that the collet chuck is in the open position.

Step 5: Guide the collet into the stage and thread the collet into the collet chuck by turning clockwise. Thread the collet into the chuck (clockwise) until it bottoms out. To prevent binding, relieve the collet slightly (counterclockwise) allowing the collet to float freely on internal threads.

NOTE: Retain the collet chuck by hand to prevent shaft rotation while threading the collet in or out.

Step 6: Insert the desired material into the collet. Actuate the collet chuck, by applying air pressure, to the closed position.

Step 7: Verify that the collet is adequately clamping the material. Adjust the collet depth or air pressure as required.

Step 8: Restore power to the stage.

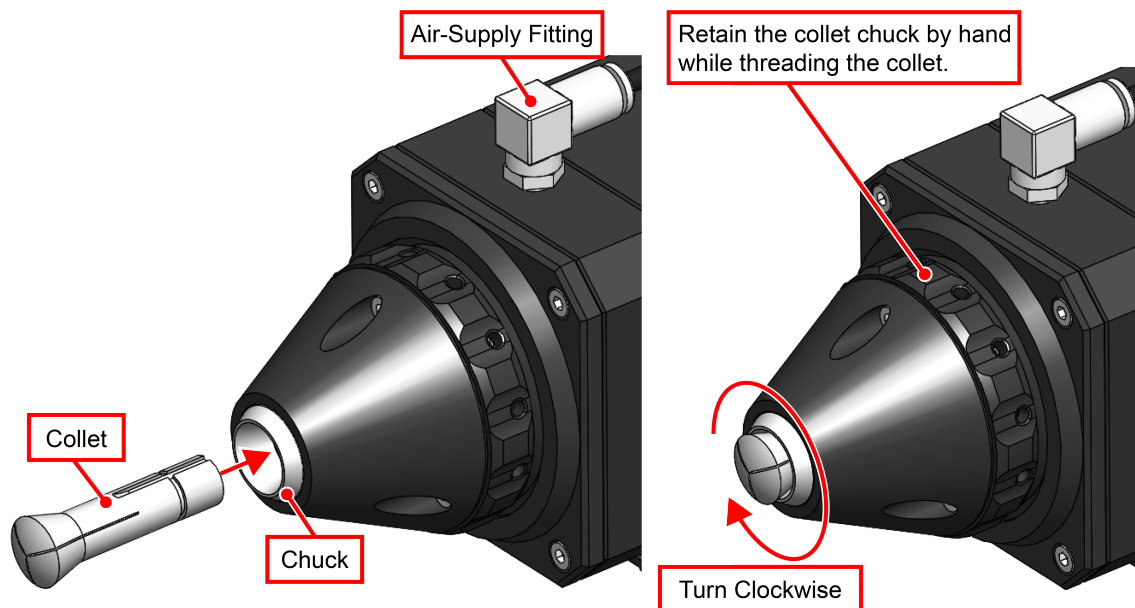


Figure 2-4: Collet Installation

To Remove a Collet:

- Step 1: Disable and remove power to the stage.
- Step 2: Turn off air pressure to expose the front of collet in chuck [Figure 2-4](#).
- Step 3: Unthread the collet from chuck by turning counter-clockwise.

NOTE : Retain the collet chuck by hand to prevent shaft rotation while threading the collet in or out.

Step 4: Store the collet in a safe location. If the collet is going to be stored for an extended period of time, or where moisture is present, it should be coated with a light film of rust preventative oil.

2.8. Collet Chuck Tube Guide

The material guide tube has a 2.5 mm hex broach that can be accessed from the front side of ASR1300. The guide tube is used to help pilot small diameter tubes through the transition from the shaft aperture to the collet. Refer to [Figure 2-5](#).



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

To Install the Guide Tube:

Step 1: Disable and remove power from the stage.

Step 2: Turn off the air pressure.

Step 3: Insert the material guide tube into the stage.

Step 4. Secure the material guide tube in the collet chuck piston by and thread it into the collet chuck piston by turning clockwise. Thread the material guide tube into the stage until it bottoms out.



WARNING: You can damage the collet chuck if you over torque the material guide tube or apply Loctite to the threads.

To Remove the Guide Tube:

Step 1: Disable and remove power to the stage.

Step 2: Turn off the air pressure.

Step 3: Remove the collet (refer to [Section 2.7.1.](#)) and then unthread the material guide tube from the collet chuck by turning guide tube counter-clockwise.

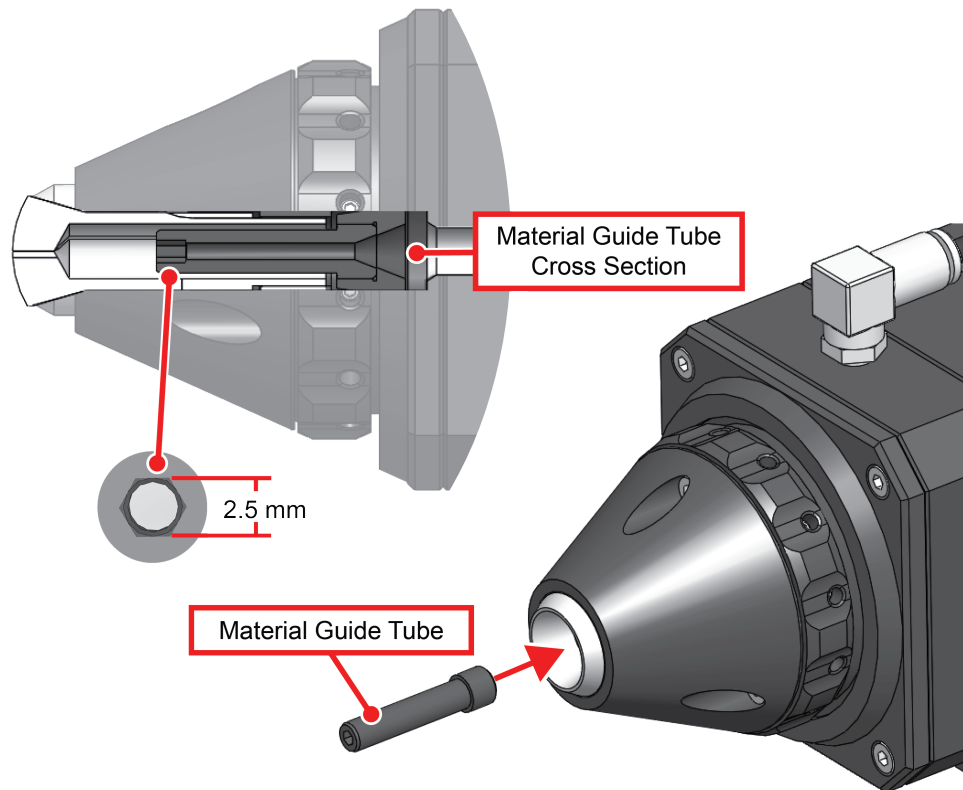


Figure 2-5: Material Guide Tube Installation

2.9. Motor Cooling with the Motor Plate

The [Qty-2] compression fittings located on both sides of the housing are design for 4 mm O.D. “stiff wall” tube. Stainless steel barb inserts are included with each stage for a 2 mm I.D. tube.

- Step 1: Using a 3/8” wrench, remove the compression fitting nut.
- Step 2: Install the barb insert into the 2 mm inner diameter of tube.
- Step 3: Pilot the nut, back ferrule, and front ferrule onto the 4 mm tube.
- Step 4: Pilot the 4 mm tube into the body of the compression fitting. Make sure the tube is seated.
- Step 5: Thread the nut onto the compression fitting body. This will seat the front and back ferrules inside the fitting before compressing them into tube wall and barb.
- Step 6: Remove the nut to verify that the front and back ferrules are clamping the tube wall and barb insert.
- Step 7: Pilot the tube back into the compression fitting body and reattach the nut.
- Step 8: Repeat this process for the second compression fitting.
- Step 9: Leak check the fittings by passing compressed air through the water lines. Brush soapy water around the fittings looking for bubbles indicating a leak point.
- Step 10: Connect the chiller to the inlet and outlet tubes.

The maximum liquid supply pressure is determined by the tube selected.

- Example: 4mm x 2mm natural LLDPE tube has a working pressure of 25 bar (360 psi) @ 73 F

In practice, the liquid supply pressure should be ~3 bar (40 psi).

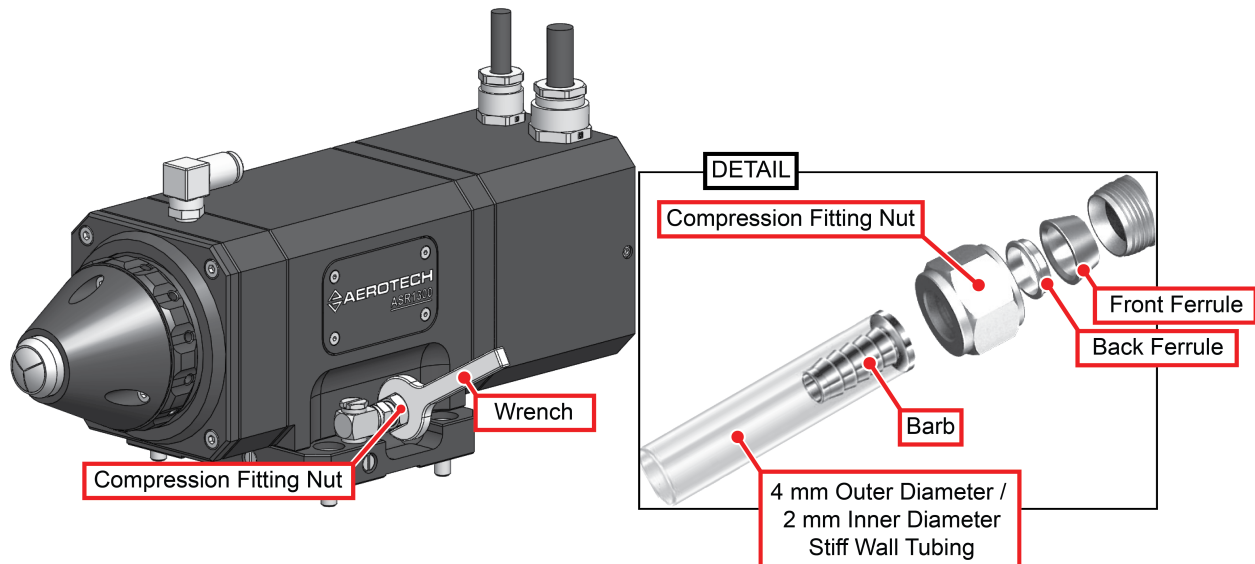


Figure 2-6: Compression Fittings Assembly

Chapter 3: Electrical Specifications and Installation



WARNING: Electrical installation must be performed by properly qualified personnel.

Electrical installation requirements will vary depending on product options. Installation instructions in this section are for ASR1300 stages equipped with standard Aerotech motors intended for use with an Aerotech motion control system. Contact Aerotech for further information regarding products that are otherwise configured.

Aerotech motion control systems are adjusted at the factory for optimum performance. When the ASR1300 is part of a complete Aerotech motion control system, setup usually involves connecting the ASR1300 to the appropriate drive chassis with the cables provided. Labels on the system components usually indicate the appropriate connections.

If system level integration was purchased, an electrical drawing showing system interconnects has been supplied with the system (separate from this documentation).

The electrical wiring from the motor and encoder are integrated at the factory. Refer to the sections that follow for standard motor wiring and connector pinouts.



WARNING: Applications requiring access to the stage while it is energized will require additional grounding and safeguards. The System Integrator or qualified installer is responsible for determining and meeting all safety and compliance requirements necessary for the integration of this stage into the final application.



DANGER: Remove power before connecting or disconnecting electrical components or cables. Failure to do so may cause electric shock or damage to the equipment.



WARNING: Operator access to the base and tabletop must be restricted while connected to a power source. Failure to do so may cause electric shock.

3.1. Motor and Feedback Connectors

Stages equipped with standard motors and encoders come from the factory completely wired and assembled.

NOTE: If using standard Aerotech motors and cables, motor and encoder connection adjustments are not required.

The protective ground connection of the ASR1300 provides motor frame ground protection only. Additional grounding and safety precautions are required for applications requiring access to the stage while it is energized. The System Integrator or qualified installer is responsible for determining and meeting all safety and compliance requirements necessary for the integration of this stage into the final application.



DANGER: Remove power before connecting or disconnecting electrical components or cables. Failure to do so may cause electric shock or damage to the equipment.



WARNING: The protective ground connection must be properly installed to minimize the possibility of electric shock.



WARNING: Operator access to the base and tabletop must be restricted while connected to a power source. Failure to do so may cause electric shock.



CAUTION: The stage controller must provide over-current and over-speed protection. Failure to do so may result in permanent damage to the motor and stage components.

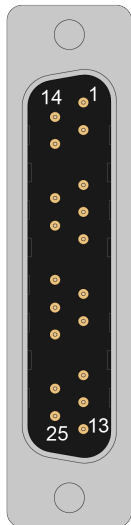
Table 3-1: 4-Pin HPD Motor Connector Pinouts (-CN1 Option)

Pin	Description	Connector
Case	Shield Connection	
A1	Motor Phase A	
A2	Motor Phase B	
A3	Motor Phase C	
1	Reserved	
2	Reserved	
3	Reserved	
4	Reserved	
5	Reserved	
A4	Frame Ground (motor protective ground)	

Table 3-2: 4-Pin D Motor Mating Connector

Mating Connector	Aerotech P/N	Third Party P/N
Backshell	ECK00656	Amphenol #17E-1726-2
Sockets [QTY. 4]	ECK00659	ITT Cannon #DM53744-6
Connector	ECK00657	ITT Cannon #DBM9W4SA197

Table 3-3: 25-Pin D Motor Connector Pinouts (-CN2 Option)

Pin	Description	Connector
1	Motor Shield (EMI shield)	
2	Frame Ground	
14	Frame Ground	
15	Frame Ground	
4	Motor Phase C	
5		
6		
17		
18		
8	Motor Phase B	
9		
20		
21		
22		
11	Motor Phase A	
12		
13		
24		
25		

Pins 3, 7, 10, 16, 19, and 23 have been removed.

Table 3-4: 25-Pin D Motor Mating Connector

Mating Connector	Aerotech P/N	Third Party P/N
Backshell	ECK00656	Amphenol #17E-1726-2
Connector	ECK00300	FCI DB25S064TLF

Table 3-5: 25-Pin D Feedback Connector Pinouts

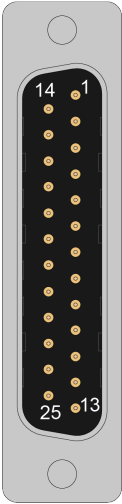
Pin	Description	Connector
1	Signal shield connection	
2	Reserved	
3	+5 V power supply (the typical requirement is 250 mA).	
4	Reserved	
5	Reserved	
6	Marker-N	
7	Marker	
8	Reserved	
9	Reserved	
10	Reserved	
11	Reserved	
12	Reserved	
13	Reserved	
14	Cosine	
15	Cosine-N	
16	+5 V power supply	
17	Sine	
18	Sine-N	
19	Reserved	
20	Common ground	
21	Common ground	
22	Reserved	
23	Reserved	
24	Reserved	
25	Reserved	

Table 3-6: 25-Pin D Feedback Mating Connector

Mating Connector	Aerotech P/N	Third Party P/N
Backshell	ECK00656	Amphenol #17E-1726-2
Connector	ECK00300	FCI DB25S064TLF

3.2. Motor and Feedback Wiring

Shielded cables are required for the motor and feedback connections.

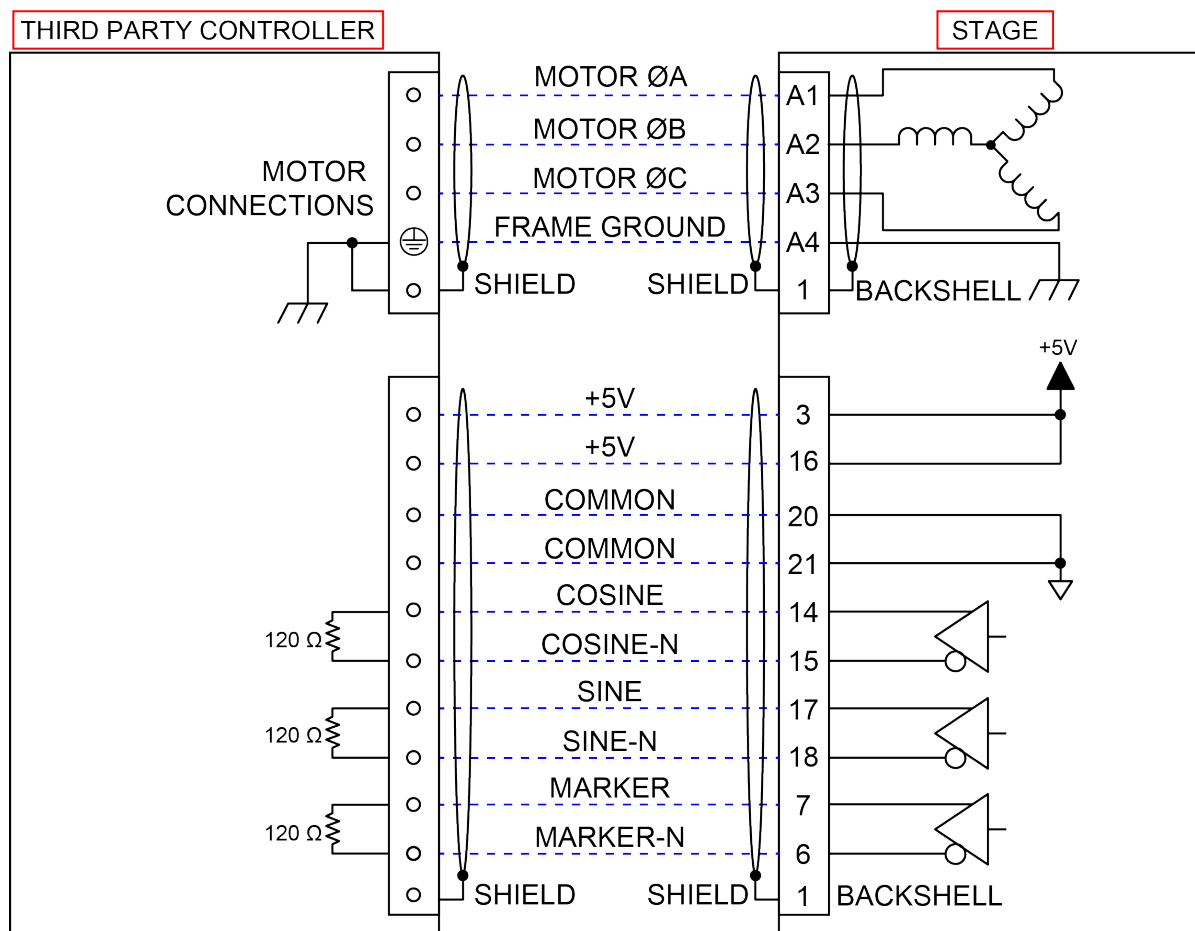


Figure 3-1: Motor and Feedback Wiring (-CN1 Option)

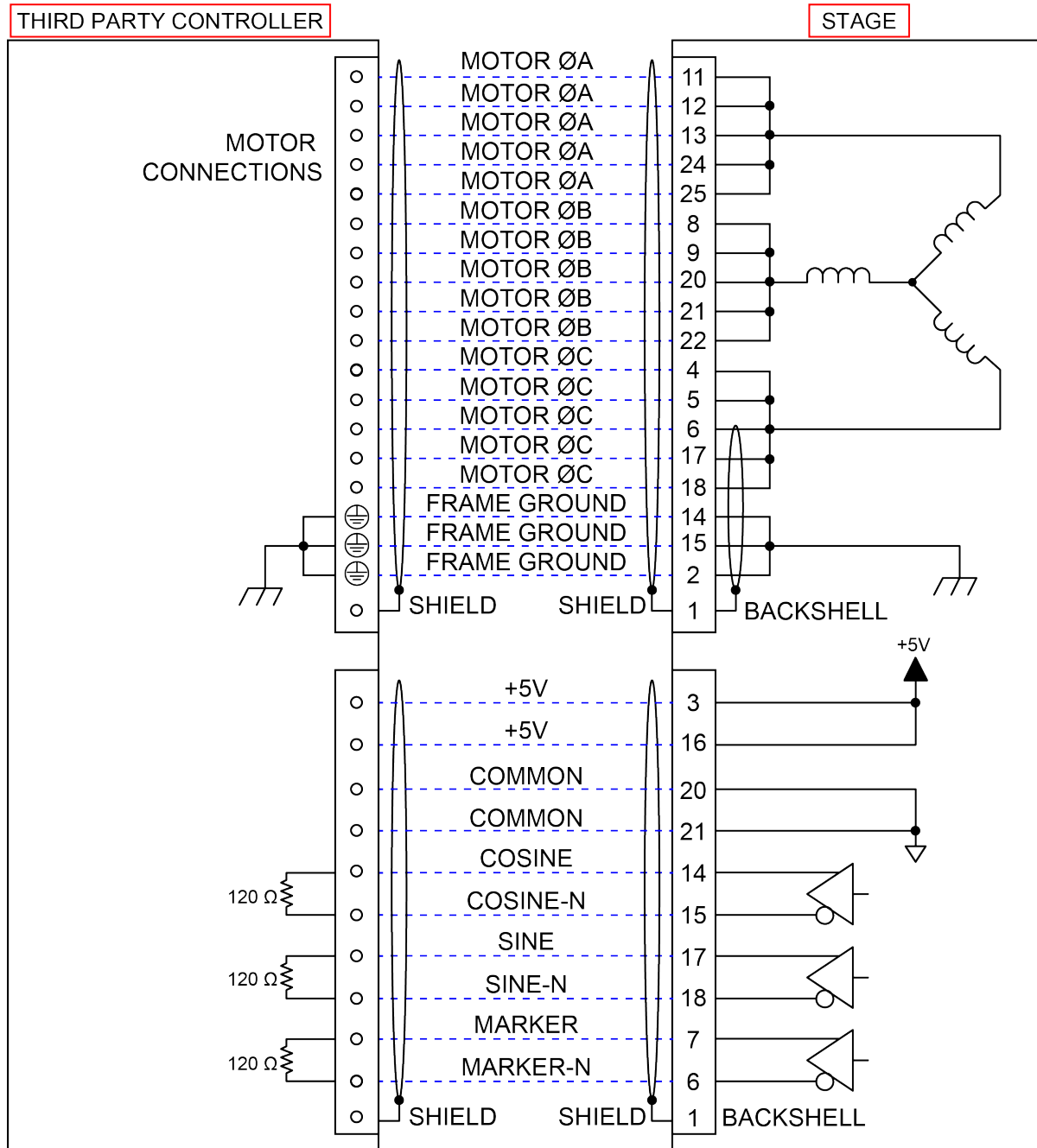


Figure 3-2: Motor and Feedback Wiring (-CN2 Option)

3.3. Motor and Feedback Specifications

Table 3-7: Feedback Specifications

Encoder Specifications	
Supply Voltage	5 V \pm 5%
Supply Current	250 mA max
Output Signals	Sinusoidal Type (Incremental Encoder): 1 V _{pk-pk} into 120 Ω Load (differential signals SIN+, SIN-, COS+, COS- are .5 V _{pk-pk} relative to ground.)

Table 3-8: Encoder Specifications

	Resolution
	7,200 lines/rev
Fundamental	180 arc sec/count
x1000	0.18 arc sec/count
x4000	0.045 arc sec/count

Table 3-9: Motor Specifications

		Motor
Performance Specifications (1,2)		
Stall Torque, Continuous (3)	N·m (oz·in)	0.51 (72.0)
Peak Torque (4)	N·m (oz·in)	1.30 (181.0)
Rated Power Output, Continuous	W	192
Electrical Specifications (2)		
BEMF Constant (Line-Line, Max)	V _{pk} /k _{rpm}	9.0
Continuous Current, Stall (3)	A _{pk} (A _{rms})	9.0 (6.4)
Peak Current, Stall (4)	A _{pk} (A _{rms})	22.5 (15.9)
Torque Constant (5)	N·m/A _{pk} (oz·in/A _{pk})	0.060 (8.00)
	N·m/A _{rms} (oz·in/A _{rms})	0.080 (11.40)
Motor Constant (3,5)	N·m/ \sqrt{W} (oz·in/ \sqrt{W})	0.055 (7.84)
Resistance, 25°C (Line-Line)	Ω	1.00
Inductance (Line-Line)	mH	1.42
Maximum Bus Voltage	V _{DC}	340
Thermal Resistance	°C/W	1.18
Number of Poles	--	8

1. Performance is dependent upon heat sink configuration, system cooling conditions, and ambient temperature
2. All performance and electrical specifications \pm 10%
3. Values shown @ 105°C rise above a 25 °C ambient temperature, with housed motor mounted to a 250 mm x 250 mm x 6 mm aluminum heat sink
4. Peak torque assumes correct rms current; consult Aerotech
5. Torque constant and motor constant specified at stall
6. Maximum winding temperature is 130 °C
7. Ambient operating temperature range 0 °C - 25 °C; consult Aerotech for performance in elevated ambient temperatures
8. All Aerotech amplifiers are rated A_{pk}; use torque constant in N·m/A_{pk} when sizing

3.4. Machine Direction

Aerotech stages are configured to have positive and negative "machine" directions. The machine direction defines the phasing of the feedback and motor signals and is dictated by the stage wiring (refer to [Section 3.5](#) for Motor and Feedback phasing information). Programming direction of a stage is set by the controller that is used to move the stage. Programming direction is typically selectable in the controller, while machine direction is hardwired in the stage. [Figure 3-3](#) shows the machine direction of ASR1300 stages.

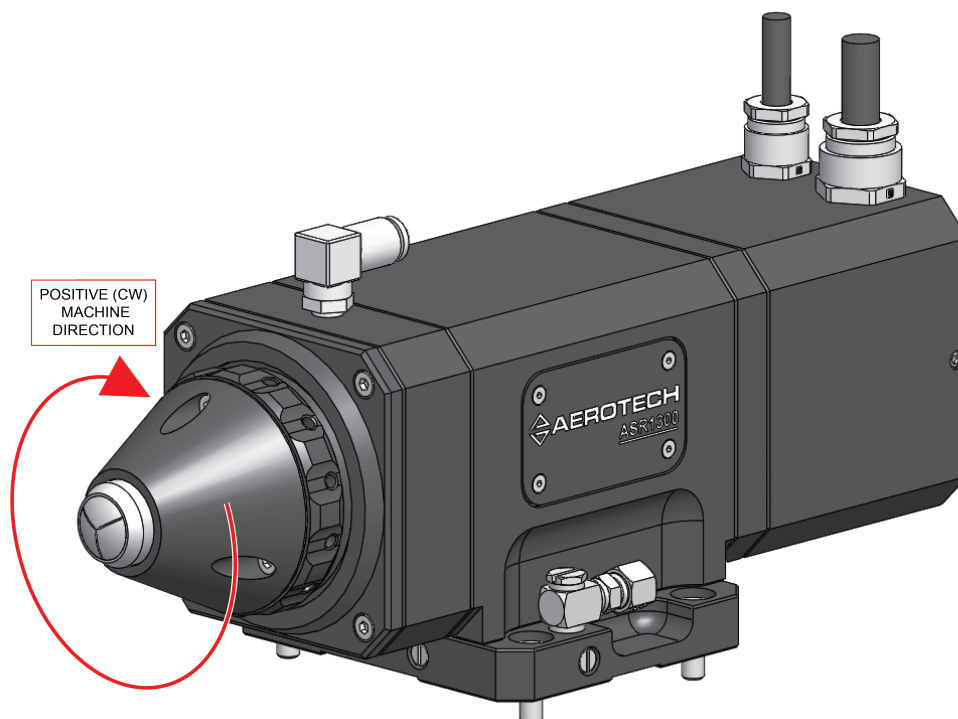


Figure 3-3: Machine Direction

3.5. Motor and Feedback Phasing

Motor phase voltage is measured relative to the virtual wye common point.

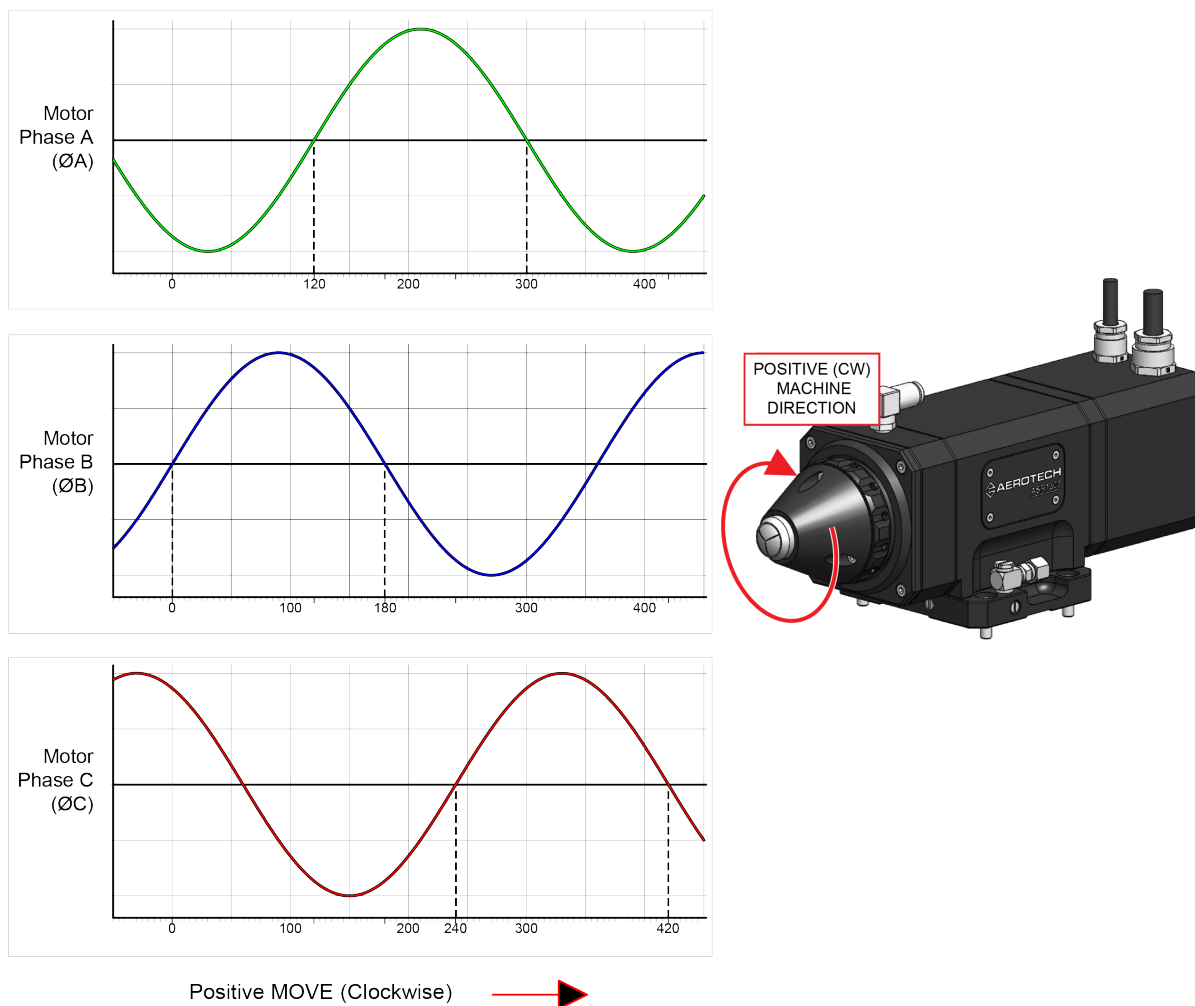


Figure 3-4: Motor Phasing

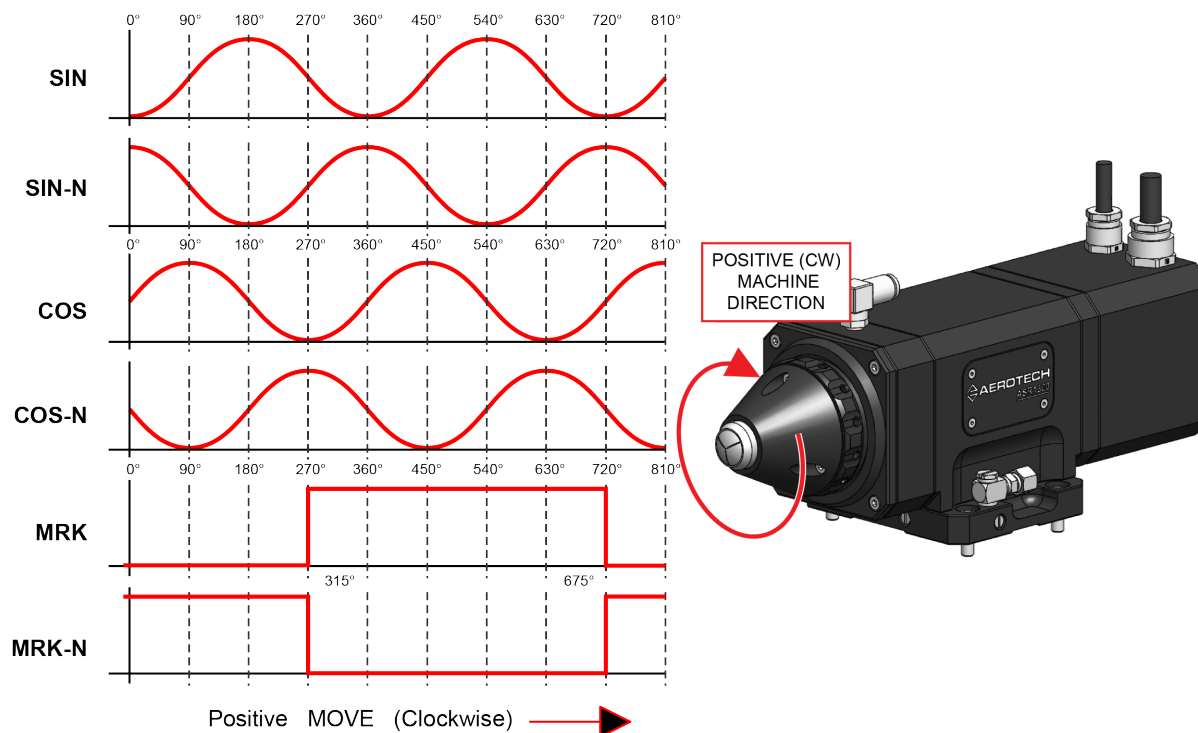


Figure 3-5: Analog Encoder Phasing Reference Diagram

Chapter 4: Maintenance



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



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

4.1. Service and Inspection Schedule

A frequent inspection and cleaning interval of the ASR1300 series stages is recommended until a trend develops for the application. The inspection and cleaning interval depends on application conditions such as duty cycle, speed, and environment. As part of the inspection process, the stage, cables, collet/collet chuck, and seals should be examined for wear, damage, and excessive air or water leakage. The bearings, motor, and encoder do not require any preventative maintenance. Once the stage condition has been assessed, the inspector should:

- Repair any damage before resuming operation of the stage
- Re-tighten loose connectors
- Replace or repair damaged cables
- Remove the collet to inspect, clean, and relubricate the collet and collet chuck
- Clean the stage and cables if needed

In general, repair and/or replacement of damaged or malfunctioning components by Aerotech field service personnel is not possible. Repair typically requires that the unit be returned to the factory. Please contact Aerotech Global Technical Support for more information.

NOTE: If the bearing area is not kept free of foreign matter and moisture, the performance and life expectancy of the stage will be reduced.

4.2. Cleaning and Lubrication

Before using a cleaning solvent on any part of the ASR1300, blow away small particles and dust with nitrogen or, less preferably, clean, dry, compressed air.

Any metal surface on the stage can be cleaned with either acetone or isopropyl alcohol. Cleaning solvents, especially acetone, should not be used on any rubber components (o-rings and seals). If rubber components require cleaning, nitrogen or clean, dry, oil-less compressed air can be used to blow them off and a lint-free cloth or rag can be used to remove excess grease, oil, or other contaminants.



WARNING: Make sure that all solvent has completely evaporated before attempting to move the stage.



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

For more information about how to clean and lubricate the collet and collet chuck, refer to [Section 4.2.1. Collet and Collet Chuck Cleaning and Lubrication](#)

For more information about how to lubricate the piston seal o-rings, refer to [Section 4.2.2. Piston Seal Lubrication](#).

4.2.1. Collet and Collet Chuck Cleaning and Lubrication



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 and a lint-free cloth. If required, nitrogen or clean, dry, oil-less 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 collet chuck and collet may need to be replaced. Contact Aerotech Technical Support for more information. Wear and fretting can be prevented with proper lubrication and maintenance intervals.

After inspection and cleaning, grease the collet chuck taper and collet taper with a small amount of lubricant. Then, install the collet into the collet chuck. Aerotech recommends using the lubricants listed in [Table 4-1](#).

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 depend on application conditions such as collet chuck duty cycle, clamping force (air pressure), and the machining environment. An inspection interval of once every 8 operational 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. The collet and chuck should also be cleaned and relubricated after sitting for an extended period of time without operation. If the lubrication sits for long periods of time, it can become dry and lose its lubrication properties. Insufficient lubrication will lead to wear, fretting corrosion, and sticking or lock-up of the collet closer. If this occurs, the machine should be immediately stopped and the collet and collet chuck cleaned and relubricated. It is also recommended that the collet and chuck interface surfaces be cleaned, inspected, and relubricated every time the collet is removed.

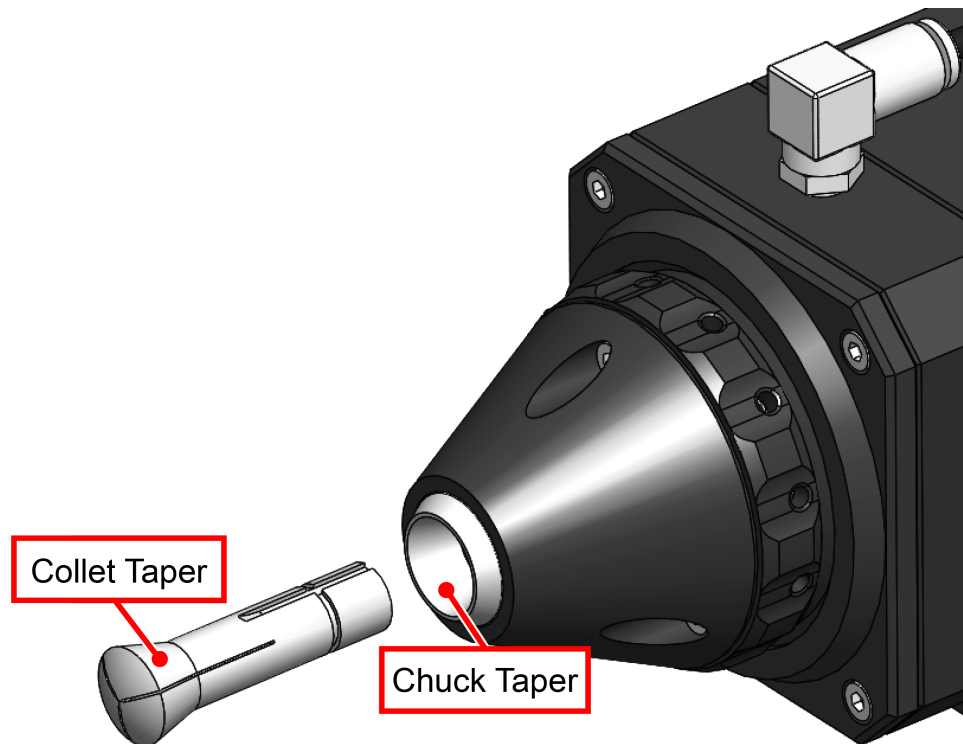


Figure 4-1: Collet and Collet Chuck Lubrication

4.2.2. Piston Seal Lubrication



WARNING: You will have to dismantle the collet chuck to access the piston seal o-rings. By gaining access to the piston seal o-rings, you will remove the original factory *Eccentricity Alignment* in the collet chuck and *Balancing* in the spindle.

NOTE: Aerotech recommends that you return the unit to the factory to be serviced by a qualified Aerotech technician.

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

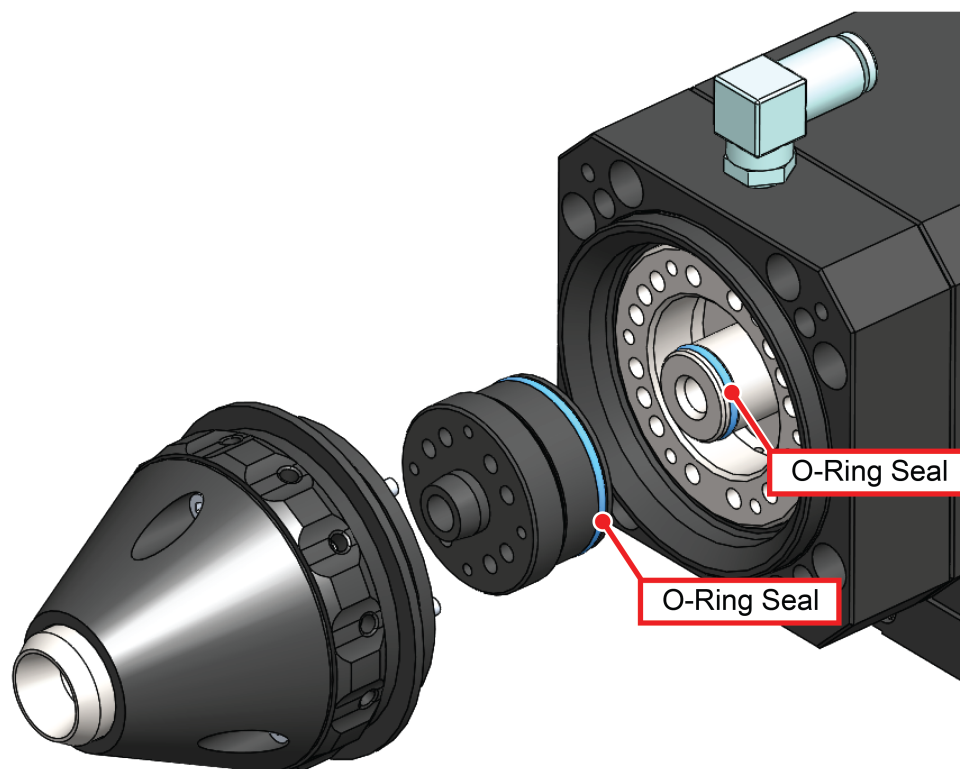


Figure 4-2: Collet Chuck Piston O-Ring Seals

4.3. Seal Replacement

4.3.1. Piston Seal Change Procedure



WARNING: You will have to dismantle the collet chuck to access the piston seal o-rings. By gaining access to the piston seal o-rings, you will remove the original factory *Eccentricity Alignment* in the collet chuck and *Balancing* in the spindle.

The collet chuck on the ASR1300 is equipped with a piston that uses O-ring seals. The seals are designed to last many collet chuck (open/close) cycles. However, due to regular wear, the seals can require replacement during the lifetime of the product. If you suspect that the piston seals have worn to the point of failure, contact Aerotech Global Technical Support.

NOTE: Aerotech recommends that you return the unit to the factory to be serviced by a qualified Aerotech technician.

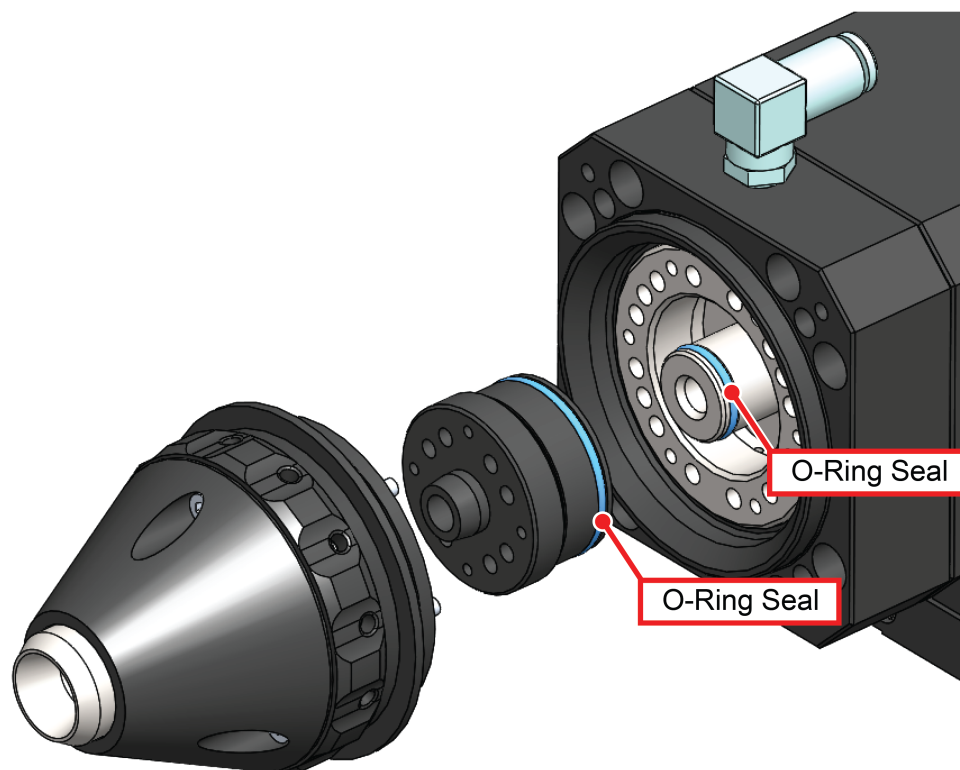


Figure 4-3: Collet Chuck Piston Seals

4.4. Troubleshooting

This section provides some information regarding typical problems.

Table 4-2: Troubleshooting

Symptom	Possible Cause and Solution
Stage will not move	Controller trap or fault (refer to the Controller documentation).
Stage moves uncontrollably	<ul style="list-style-type: none">Encoder (sine and cosine) signal connections (refer to Chapter 3 and Controller documentation).Motor Connections (refer to Chapter 3 and the Controller documentation).
Stage oscillates or squeals	<ul style="list-style-type: none">Gains misadjusted (refer to the Controller documentation).Encoder signals (refer to the Controller documentation).
Collet Chuck will not close	<ul style="list-style-type: none">Insufficient air pressure supplied to the stage. Make sure there are no blockages in the supply line and the pressure is high enough (refer to Section 2.4.).Collet not threaded in all the way. Follow procedures in Section 2.7. to ensure collet is installed properly
Collet Chuck will not open	<ul style="list-style-type: none">Insufficient air pressure supplied to the stage. Make sure there are no blockages in the supply line and the pressure is high enough (refer to Section 2.4.).The collet has not been lubricated properly or the lubrication needs to be replenished (refer to Section 4.2.1.).

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Appendix A: Warranty and Field Service

Aerotech, Inc. warrants its products to be free from harmful 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, whether 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 on 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.

THE EXPRESS WARRANTY SET FORTH HEREIN IS IN LIEU OF AND EXCLUDES ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, BY OPERATION OF LAW OR OTHERWISE. IN NO EVENT SHALL AEROTECH BE LIABLE FOR CONSEQUENTIAL OR SPECIAL DAMAGES.

Return Products Procedure

Claims for shipment damage (evident or concealed) must be filed with the carrier by the buyer. Aerotech must be notified within thirty (30) days of shipment of incorrect material. 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. A "Return Materials Authorization (RMA)" number must accompany any returned product(s). The RMA number may be obtained by calling an Aerotech service center or by submitting the appropriate request available on our website (www.aerotech.com). 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 thirty (30) days after the issuance of a return authorization number will be subject to review.

Visit <https://www.aerotech.com/global-technical-support.aspx> for the location of your nearest Aerotech Service center.

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 expedited method of return, the product(s) will be shipped collect. Warranty repairs do not extend the original warranty period.

Fixed Fee Repairs - Products having fixed-fee pricing will require a valid purchase order or credit card particulars before any service work can begin.

All Other Repairs - After Aerotech's evaluation, 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 thirty (30) days of notification will result in the product(s) being returned as is, at the buyer's expense.

Repair work is warranted for ninety (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 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.

Service Locations

<http://www.aerotech.com/contact-sales.aspx?mapState=showMap>

USA, CANADA, MEXICO	CHINA	GERMANY
Aerotech, Inc. Global Headquarters Phone: +1-412-967-6440 Fax: +1-412-967-6870	Aerotech China Full-Service Subsidiary Phone: +86 (21) 5508 6731	Aerotech Germany Full-Service Subsidiary Phone: +49 (0)911 967 9370 Fax: +49 (0)911 967 93720
TAIWAN	UNITED KINGDOM	
Aerotech Taiwan Full-Service Subsidiary Phone: +886 (0)2 8751 6690	Aerotech United Kingdom Full-Service Subsidiary Phone: +44 (0)1256 855055 Fax: +44 (0)1256 855649	

Have your customer order number ready before calling.

Appendix C: Revision History

Revision	General Information
1.01.00	Updated air filtration specification from 0.25 µm to 1.0 µm (Section 2.4.)
1.00.00	New manual

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