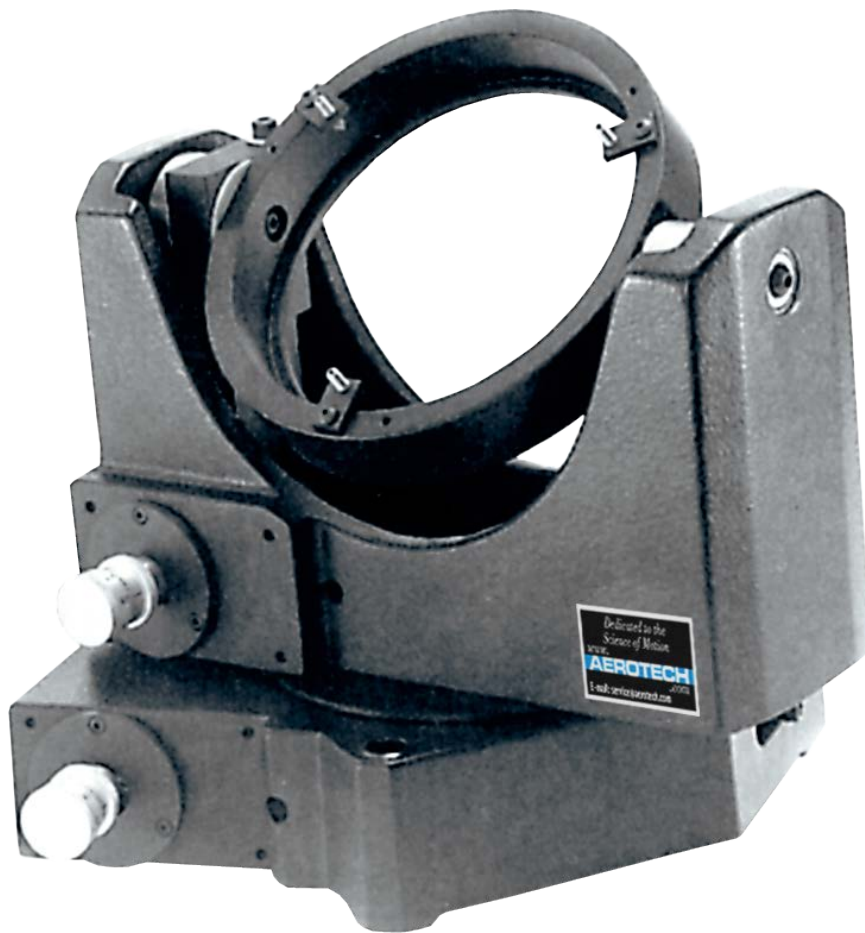




# AOM130 Gimbal User Manual

Revision: 1.00.00



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## Safety Procedures and Warnings

This manual tells you how to carefully and correctly use and operate the AOM130. Read all parts of this manual before you install or operate the AOM130 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.

**NOTE:** Aerotech continually improves its product offerings; listed options may be superseded at any time.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](http://www.aerotech.com) for the most up-to-date information.



**WARNING:** To minimize the possibility of injury or damage to the equipment, the following precautions must be followed.

1. 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.
2. The AOM130 must be mounted securely. Improper mounting can result in injury and damage to the equipment.
3. Use care when moving the AOM130. Lifting or transporting the AOM130 improperly can result in injury or damage to the AOM130.
4. 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.
5. Operators must be trained before operating this equipment.
6. 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:*

AOM130

*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*

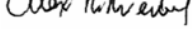
it is not allowed to put the equipment into service until the machinery into which it is to be incorporated or of which it is to be a component has been found and declared to be in conformity with the provisions of the Directive 2006/42/EC and with national implementing legislation, for example, as a 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  
**Address:** Aerotech Ltd  
The Old Brick Kiln, Ramsdell, Tadley  
Hampshire RG26 5PR  
UK

**Name**  / Alex Weibel  
**Position** Engineer Verifying Compliance  
**Location** Pittsburgh, PA  
**Date** 9/13/2019



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## Chapter 1: Overview

Table 1-1: AOM130 Optical Mount Model Options

AOM130 Optical Mount	
Cell Size (Required)	
-6	6 in (152.5 mm) diameter optic
-9	9 in (228.6 mm) diameter optic
-12	12 in (304.8 mm) diameter optic
-16	16 in (406.4 mm) diameter optic
-20	20 in (508.0 mm) diameter optic
-24	24 in (609.6 mm) diameter optic
Adapter (Optional)	
-AOM6T5	6 in (150 mm) diameter cell to 5 in (125 mm) diameter optic
-AOM9T8	9 in (225 mm) diameter cell to 8 in (200 mm) diameter optic
-AOM12T10	12 in (300 mm) diameter cell to 10 in (250 mm) diameter optic

## 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**

<b>Ambient Temperature</b>	Operating: 10° to 35° C Deviation in temperature can result in performance degradation. The optimal operating temperature is 20° C ±2° C. If at any time the operating temperature deviates from 20° C, degradation in performance could occur.
	Storage: 0° to 40° C
<b>Humidity</b>	Operating: 20% to 60% RH
	Storage: 10% to 70% RH, non-condensing in original packaging
<b>Protection Rating</b>	The gimbals have limited protection against airborne particles but not water. This equates to an ingress protection rating of IP40.
<b>Use</b>	Indoor use only

## 1.2. Basic Specifications

**Table 1-3: AOM130 Series Specifications**

Model	AOM130-6	AOM130-9	AOM130-12
Resolution <sup>(1)</sup>	0.2 $\mu$ rad (0.041 arc sec)	0.15 $\mu$ rad (0.031 arc sec)	0.15 $\mu$ rad (0.031 arc sec)
Thimble Graduation	4.4 $\mu$ rad (0.90 arc sec)	3.3 $\mu$ rad (0.689 arc sec)	3.3 $\mu$ rad (0.689 arc sec)
Clear Aperture	144.27 mm	218.95 mm	292.1 mm
Range <sup>(2)</sup> (Rotational Freedom)	360° AZ/EL		
Range (Adjustment Knob)	$\pm 4^\circ$ AZ/EL		
Component Diameter (Max)	152.4 mm	228.6 mm	304.8 mm
Component Thickness (Max)	26.92 mm	41.4 mm	53.85 mm
Component Weight (Max)	4.4 kg	15 kg	35 kg
Material	Aluminum		
Finish	Black Epoxy Paint		
Weight	8.2 kg	16.4 kg	20.9 kg
(1) Per 0.5° of the fine adjustment.			
(2) For 360° rotational freedom, release clamp screws.			

Model	AOM130-16	AOM130-20	AOM130-24
Resolution <sup>(1)</sup>	0.15 $\mu$ rad (0.031 arc sec)	0.13 $\mu$ rad (0.026 arc sec)	0.13 $\mu$ rad (0.026 arc sec)
Thimble Graduation	3.3 $\mu$ rad (0.689 arc sec)	2.8 $\mu$ rad (0.58 arc sec)	2.8 $\mu$ rad (0.58 arc sec)
Clear Aperture	393.7 mm	488.95 mm	590.55 mm
Range <sup>(2)</sup> (Rotational Freedom)	360° AZ/EL		
Range (Adjustment Knob)	$\pm 3^\circ$ AZ/EL		
Component Diameter (Max)	406.4 mm	508.0 mm	609.6 mm
Component Thickness (Max)	63.5 mm	88.9 mm	101.6 mm
Component Weight (Max)	73 kg	114 kg	264 kg
Material	Aluminum		
Finish	Black Epoxy Paint		
Weight	24.1 kg	61.8 kg	74.6 kg
(1) Per 0.5° of the fine adjustment.			
(2) For 360° rotational freedom, release clamp screws.			

### 1.3. Vacuum Operation

Contact the factory for information regarding operation in a vacuum environment.

Preparation and considerations for operation in a vacuum environment:

- Lubrication with vacuum-compatible lubricants
- Use of materials, fasteners, and coatings with vacuum outgas performance compatible with the level of vacuum specified
- For high vacuum stages, elimination of situations that may allow gases to become temporarily trapped during pump down
- Extensive cleaning prior to assembly in a clean environment and packaging in a special polyethylene bag
- Use of components able to withstand elevated temperatures (non-operating) for bake-out performances

## Chapter 2: Mechanical Specifications and Installation



**WARNING:** AOM130 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



**DANGER/HEAVY:** Manually lifting and moving the stage requires a minimum of two people on either side of the stage. Refer to [Section 1.2](#) for stage mass specifications.

- Do not attempt to lift heavy loads single handed.
- Follow the lifting instructions and only manually lift from the specified surfaces (if lifting hardware hasn't been supplied).



**WARNING:** It is the customer's responsibility to safely and carefully lift the stage.

- Make sure that all moving parts are secure before moving the AOM130. Unsecured moving parts may shift and cause bodily injury.
- Improper handling could adversely affect the performance of the AOM130. Use care when moving the AOM130.

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

#### Lifting Instructions

To avoid injury, use two or more people to move and install this product.

Obey your cleanroom and vacuum preparation handling procedures when opening the containers. Unpack the AOM130 as near to the installation location as possible to minimize contact with the parts. Open each container and inspect the contents for signs of damage.

Remove the packing material and keep it to store and transport the gimbal in the future.

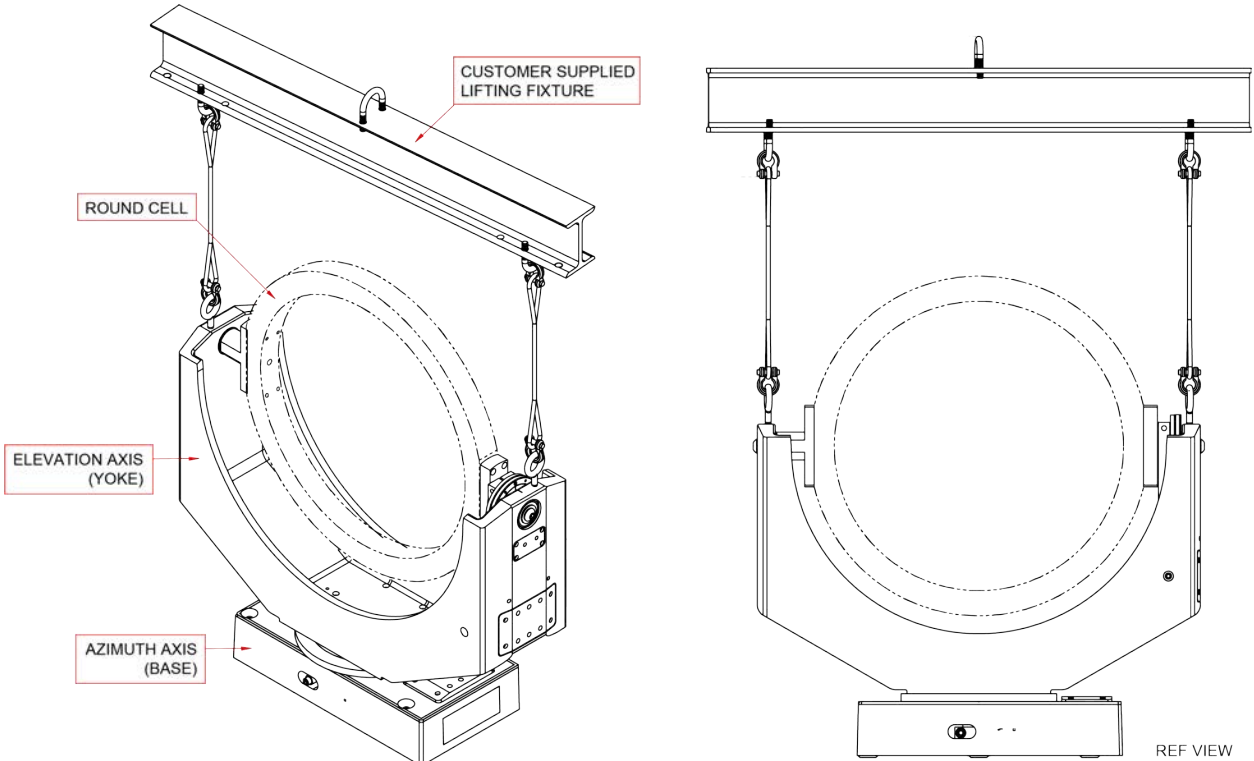
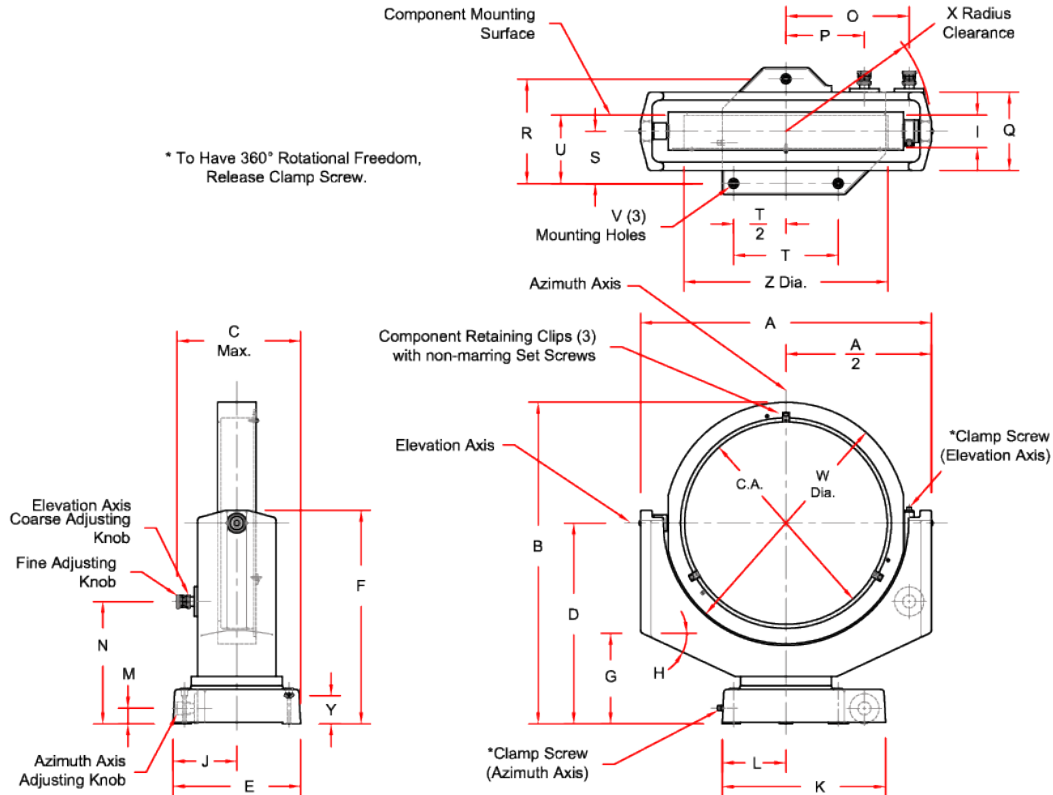


Figure 2-1: Shipping and Lifting Brackets

## 2.2. Dimensions



Dimensions - Millimeters									
Basic Model	A	B	C	D	E	F	G	H	I
AOM130-6	269.7	294.4	211.8	206.3	209.6	231.7	63.5	No Angle	27.0
AOM130-9	368.3	412.8	240.5	279.4	247.7	304.8	95.3	No Angle	41.4
AOM130-12	457.2	500.1	240.5	322.3	247.7	347.7	106.4	5°	53.9
AOM130-16	565.2	625.6	240.5	390.6	247.7	416.0	177.8	25°	63.5
AOM130-20	704.9	787.4	272.3	495.3	340.0	530.3	231.6	30°	88.9
AOM130-24	806.5	906.5	272.3	558.8	340.0	593.8	261.1	30°	101.6
Basic Model	J	K	L	M	N	O	P	Q	R
AOM130-6	95.3	247.7	95.3	31.8	92.0	96.8	114.3	95.3	175.0
AOM130-9	124.0	317.5	124.0	30.7	127.0	141.2	152.4	114.3	200.0
AOM130-12	124.0	317.5	124.0	30.7	169.9	185.7	152.4	114.3	200.0
AOM130-16	124.0	317.5	124.0	30.7	238.2	239.0	152.4	152.4	200.0
AOM130-20	119.1	422.3	193.8	41.2	314.4	301.7	181.4	190.5	300.0
AOM130-24	119.1	422.3	193.7	41.3	377.4	352.5	181.4	203.2	300.0
Basic Model	S	T	U	V	W	X	Y	Z	C.A.
AOM130-6	75.0	150.0	87.1	7.1	176.3	149.9	47.6	153.9	144.3
AOM130-9	100.0	200.0	119.9	7.1	266.7	188.9	54.0	230.9	218.9
AOM130-12	100.0	200.0	125.2	7.1	355.6	233.4	54.0	307.9	292.1
AOM130-16	100.0	200.0	132.6	7.1	469.9	284.2	54.0	409.5	393.7
AOM130-20	100.0	350.0	146.1	10.4	584.2	371.4	74.6	571.1	489.0
AOM130-24	100.0	350.0	152.4	10.4	695.5	419.1	74.6	612.7	590.6

Figure 2-2: AOM130 Dimensions

### 2.3. Securing the AOM130 Base to the Mounting Surface



**WARNING:** The AOM130 must be mounted securely. Improper mounting can result in injury and damage to the equipment.



**WARNING:** Make sure that all moving parts are secure before moving the AOM130. Unsecured moving parts may shift and cause bodily injury.



**DANGER/HEAVY:** Manually lifting and moving the stage requires a minimum of two people on either side of the stage. Refer to [Section 1.2](#) for stage mass specifications.

- Do not attempt to lift heavy loads single handed.
- Follow the lifting instructions and only manually lift from the specified surfaces (if lifting hardware hasn't been supplied).

The mounting surface should be flat and have adequate stiffness to achieve the maximum performance from the AOM130. When the AOM130 is mounted to a non-flat surface, the stage can be distorted while 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.

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 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 2.5  $\mu\text{m}$ .

AOM130 gimbal has a fixed mounting pattern as shown in [Figure 2-3](#).

Tightening torque values are dependent on the properties of the mounting hardware and of the surface on which the gimbal is being mounted. Values provided in [Table 2-1](#) are typical values and may not be accurate for your mounting surface.

**Table 2-1: Gimbal to Mounting Surface Hardware**

Gimbal	Mounting Hardware	Typical Screw Torque
AOM130-6 AOM130-9 AOM130-12 AOM130-16	M6 SHCS X 65 mm (minimum length; 3 places)	6 N·m
AOM130-20 AOM130-24	M10 SHCS X 95 mm (minimum length; 3 places)	30 N·m



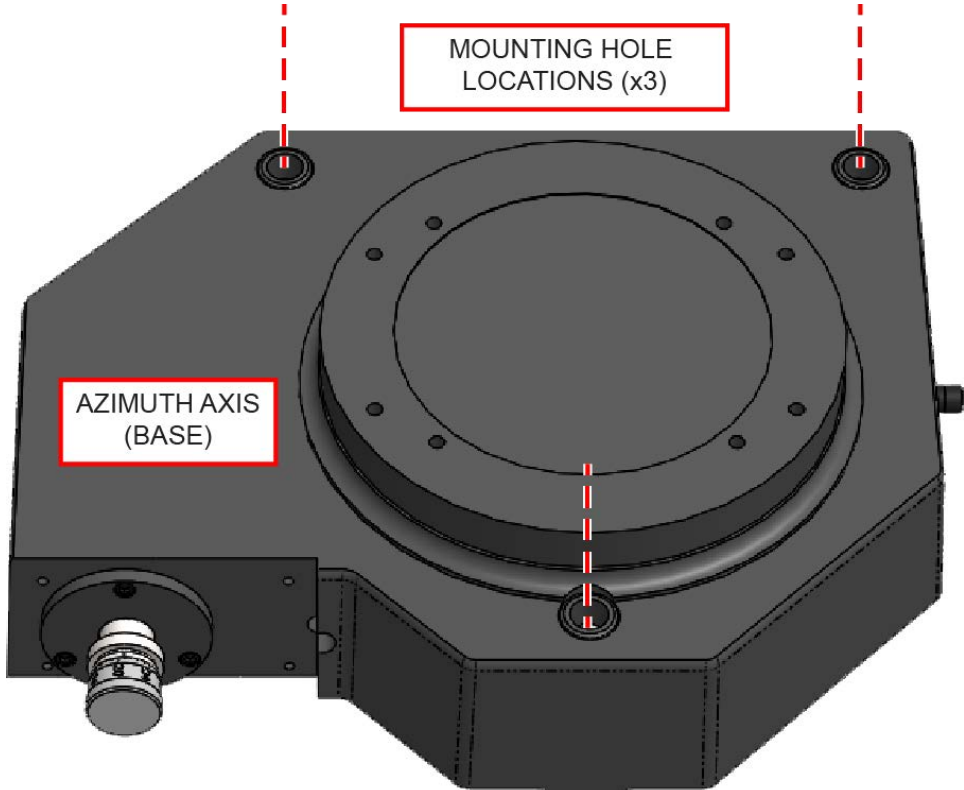


Figure 2-3: View of an AOM130 Mounting Holes

## 2.4. Attaching the Payload to the Stage

Inspect the mounting surface for dirt or unwanted residue and clean if necessary. Clean the mounting surface with a lint free cloth and isopropyl alcohol and allow the cleaning solvent to completely dry.

The payload must be flat, rigid, and comparable to the stage in quality to maintain optimum performance.

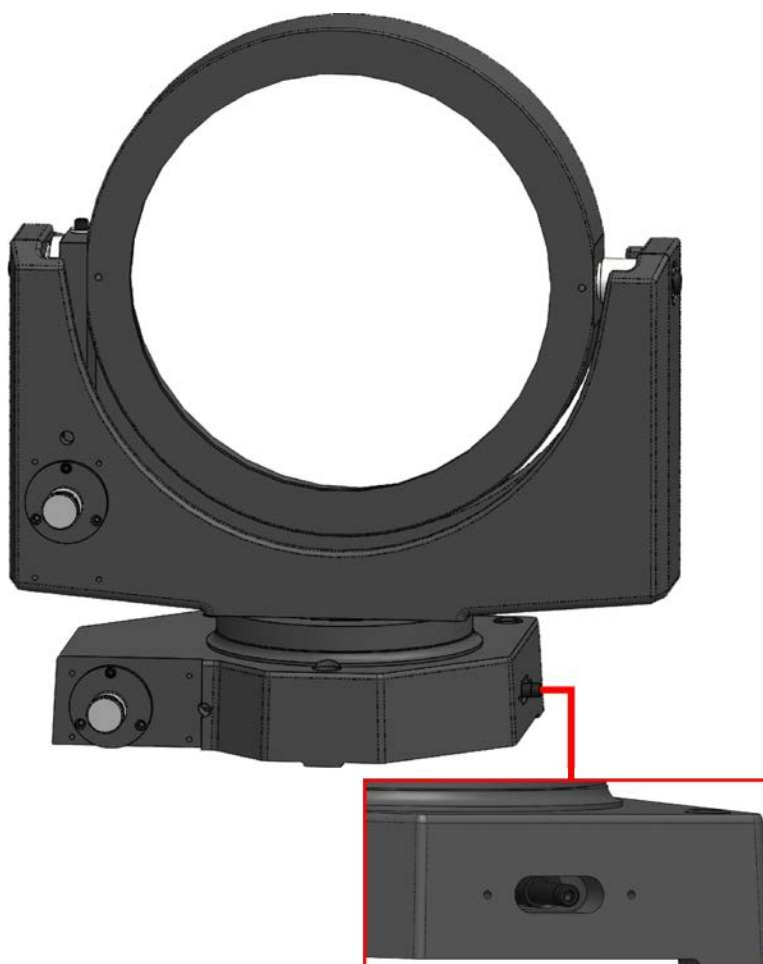
## Chapter 3: Operation

### 3.1. Full 360° AZ and EL Positioning

Rotational freedom can be extended to a full 360° by loosening the tangent arm clamping screws on the Azimuth or Elevation axes with a long arm hex 5/16 inch Allen Wrench. Manually rotate each axis anywhere in a 360° range. Re-tighten the tangent arm clamping screw (torque to 25 N·m).



**DANGER:** Do not attempt to manually move the azimuth axis until the Azimuth Axis Tangent Arm Clamping Screw has been loosened.



AZ Tangent Clamping Screw

**Figure 3-1: Azimuth Axis Tangent Arm Clamping Screw**



**DANGER:** Do not attempt to manually move the elevation axis until the Elevation Axis Tangent Arm Clamping Screw has been loosened.



**Figure 3-2:** Elevation Axis Tangent Arm Clamping Screw

## Chapter 4: Maintenance

### 4.1. Service and Inspection Schedule

Monthly inspections should include but not be limited to:

- Visually inspect the gimbal
- Clean the gimbal and any components as needed
- Repair any damage before operating the gimbal
- Inspect and perform an operational check on all safeguards and protective devices

## 4.2. Cleaning and Lubrication

### Cleaning

Before using a cleaning solvent on any part of the AOM130, blow away small particles and dust with nitrogen or, less preferably, clean, dry, compressed air.

Any external metal surface of the AOM130 can be cleaned with isopropyl alcohol on a lint-free cloth.



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

### Lubrication

Lubricant inspection and replenishment in AOM130 series gimbals depends on conditions such as duty cycle, speed, and the environment. An inspection interval of once every two weeks is recommended until a trend develops for the application. Longer or shorter intervals may be required to maintain the film of lubricant.

If the application process uses only a small portion of travel for most of the duty cycle, periodically drive the gimbal through full travel to redistribute the lubrication in the bearings and drive screw.

Please contact AerotechGlobal Technical Support if it is determined that lubrication may be required. Lubricant replenishment for custom AOM130 gimbals must be done at the Aerotech factory.

**Table 4-1: Recommended Lubricants**

Gimbal	Lubricant
AOM130	DOW BR2-PLUS
	CMD Extreme Pressure Lube #3
NOTE: Grease for cleanroom or vacuum environments will be different. Consult the factory for more information.	

## 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](http://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 B: Revision History

Revision	General Information
1.00.00	New Manual

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