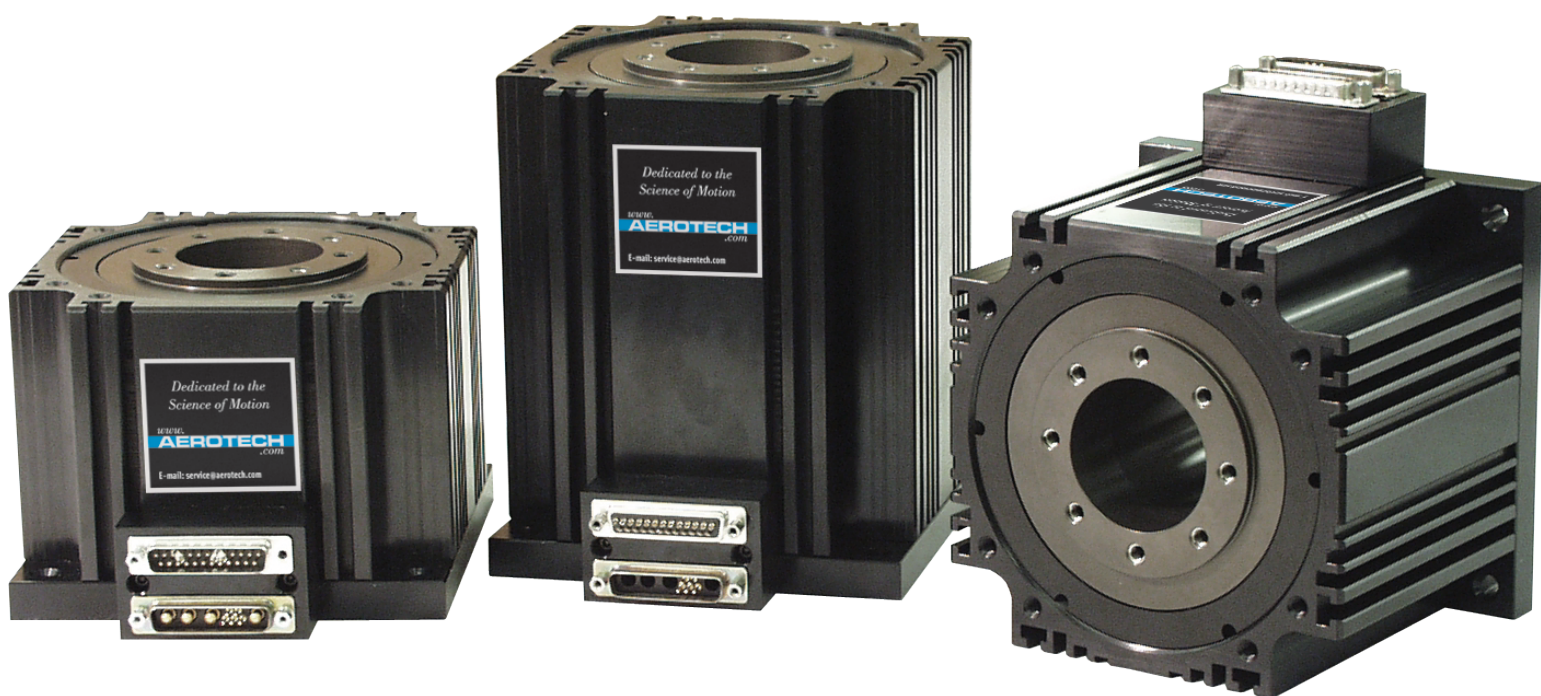




# ADRT Hardware Manual

Revision: 1.02.00



## Global Technical Support

Go to [www.aerotech.com/global-technical-support](http://www.aerotech.com/global-technical-support) for information and support about your Aerotech products. The website provides downloadable resources (such as up-to-date software, product manuals, and Help files), training schedules, and PC-to-PC remote technical support. You can also complete Product Return (RMA) forms and get information about repairs and spare or replacement parts. For immediate help, contact a service office or your sales representative. Have your customer order number available before you call or include it in your email.

United States (World Headquarters)	
Phone: +1-412-967-6440 Fax: +1-412-967-6870 Email: <a href="mailto:service@aerotech.com">service@aerotech.com</a>	101 Zeta Drive Pittsburgh, PA 15238-2811 <a href="http://www.aerotech.com">www.aerotech.com</a>
United Kingdom	Japan
Phone: +44 (0)1256 855055 Fax: +44 (0)1256 855649 Email: <a href="mailto:service@aerotech.co.uk">service@aerotech.co.uk</a>	Phone: +81 (0)50 5830 6814 Fax: +81 (0)43 306 3773 Email: <a href="mailto:service@aerotechkk.co.jp">service@aerotechkk.co.jp</a>
Germany	China
Phone: +49 (0)911 967 9370 Fax: +49 (0)911 967 93720 Email: <a href="mailto:service@aerotechgmbh.de">service@aerotechgmbh.de</a>	Phone: +86 (21) 5508 6731 Email: <a href="mailto:service@aerotech.com">service@aerotech.com</a>
France	Taiwan
Phone: +33 2 37 21 87 65 Email: <a href="mailto:service@aerotech.co.uk">service@aerotech.co.uk</a>	Phone: +886 (0)2 8751 6690 Email: <a href="mailto:service@aerotech.tw">service@aerotech.tw</a>

This manual contains proprietary information and may not be reproduced, disclosed, or used in whole or in part without the express written permission of Aerotech, Inc. Product names mentioned herein are used for identification purposes only and may be trademarks of their respective companies.

Copyright © 2009-2018, Aerotech, Inc., All rights reserved.

Aerotech Worldwide

United States ■ France ■ Germany ■ United Kingdom  
China ■ Japan ■ Taiwan



## Table of Contents

<b>ADRT Hardware Manual</b> .....	<b>1</b>
Table of Contents .....	3
List of Figures .....	4
List of Tables .....	5
Safety Procedures and Warnings .....	7
EU Declaration of Incorporation .....	9
<b>Chapter 1: Overview</b> .....	<b>11</b>
1.1. Environmental Specifications .....	13
1.2. Accuracy and Temperature Effects .....	13
1.3. Basic Specifications .....	14
<b>Chapter 2: Mechanical Specifications and Installation</b> .....	<b>17</b>
2.1. Unpacking and Handling the Stage .....	17
2.2. Dimensions .....	18
2.3. Securing the Stage to the Mounting Surface .....	25
2.4. Attaching the Payload to the Stage .....	27
2.4.1. Load Capability .....	28
2.5. Travel Adjustment .....	31
2.5.1. Optical Limit Adjustment .....	31
2.5.2. Hard Stop Adjustment .....	33
<b>Chapter 3: Electrical Installation</b> .....	<b>35</b>
3.1. Motor and Feedback Connectors .....	36
3.2. Motor and Feedback Wiring .....	39
3.3. Motor and Feedback Specifications .....	40
3.4. Limits, Marker, and Machine Direction .....	46
3.5. Motor and Feedback Phasing .....	47
<b>Chapter 4: Maintenance</b> .....	<b>49</b>
4.1. Service and Inspection Schedule .....	49
4.2. Cleaning and Lubrication .....	49
4.5. Troubleshooting .....	50
<b>Appendix A: Warranty and Field Service</b> .....	<b>51</b>
<b>Appendix B: Revision History</b> .....	<b>53</b>
<b>Index</b> .....	<b>55</b>

**List of Figures**

Figure 2-1: ADRT100 Dimensions ..... 18

Figure 2-2: ADRT150 Dimensions ..... 19

Figure 2-3: ADRT150 Limited Travel Dimensions ..... 20

Figure 2-4: ADRT200 Dimensions ..... 21

Figure 2-5: ADRT200 Limited Travel Dimensions ..... 22

Figure 2-6: ADRT260 Dimensions ..... 23

Figure 2-7: ADRT260 Limited Travel Dimensions ..... 24

Figure 2-8: Mounting Holes Locations ..... 26

Figure 2-9: Load Orientations ..... 28

Figure 2-10: ADRT100 Cantilevered Load Capability ..... 28

Figure 2-11: ADRT150 Cantilevered Load Capability ..... 29

Figure 2-12: ADRT200 Cantilevered Load Capability ..... 30

Figure 2-13: ADRT260 Cantilevered Load Capability ..... 30

Figure 2-14: Bottom View of the ADRT ..... 31

Figure 2-15: ADRT Limit Flag Adjustment ..... 32

Figure 3-1: Motor and Feedback Wiring ..... 39

Figure 3-2: Machine Direction ..... 46

Figure 3-3: Hall Phasing ..... 47

Figure 3-4: Analog Encoder Phasing Reference Diagram ..... 48

Figure 3-5: Encoder Phasing Reference Diagram (Standard) ..... 48

## List of Tables

Table 1-1: Model Options .....	11
Table 1-2: Environmental Specifications .....	13
Table 1-3: ADRT Series Specifications (ADRT100 and ADRT150) .....	14
Table 1-4: ADRT Series Specifications (ADRT200 and ADRT260) .....	15
Table 2-1: Stage to Mounting Surface Hardware .....	25
Table 3-1: 4-Pin Motor Connector Pin Assignments .....	37
Table 3-2: 25-Pin Motor Connector Pin Assignments (ADRT100 Only) .....	37
Table 3-3: 25-Pin Feedback Connector Pin Assignments .....	38
Table 3-4: Feedback Specifications .....	40
Table 3-5: Encoder Specifications .....	41
Table 3-6: Maximum Speeds for the Encoder Option .....	41
Table 3-7: ADRT100 Motor Specifications (S-76-xx Rotary Motor) .....	42
Table 3-8: ADRT150 Motor Specifications (S-130-xx Rotary Motor) .....	43
Table 3-9: ADRT200 Motor Specifications (S-180-xx Rotary Motor) .....	44
Table 3-10: ADRT260 Motor Specifications (S-240-xx Rotary Motor) .....	45

*This page intentionally left blank.*

## Safety Procedures and Warnings

Read this manual in its entirety before installing, operating, or servicing this product. If you do not understand the information contained herein, contact an Aerotech representative before proceeding. Strictly adhere to the statements given in this section and other handling, use, and operational information given throughout the manual to avoid injury to you and damage to the equipment.

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.



**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 ADRT 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 ADRT stage must be mounted securely. Improper mounting can result in injury and damage to the equipment.
5. Use care when moving the ADRT stage. Lifting or transporting the ADRT stage improperly can result in injury or damage to the ADRT.
6. This product is intended for light industrial manufacturing or laboratory use. Use of this product for unintended applications can result in injury and damage to the equipment.
7. 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.
8. Operators must be trained before operating this equipment.
9. All service and maintenance must be performed by qualified personnel.

*This page intentionally left blank.*



## EU Declaration of Incorporation

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

*herewith declares that the product:*

ADRT 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*

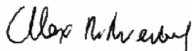
it is not allowed to put the equipment into service until the machinery into which it is to be incorporated or of which it is to be a component has been found and declared to be in conformity with the provisions of the Directive 2006/42/EC and with national implementing legislation, i.e., as a whole, 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:** 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** 10/31/2018



*This page intentionally left blank.*

## 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](http://www.aerotech.com) for the most up-to-date information.

**Table 1-1: Model Options**

<b>ADRT Series Direct Drive Rotary Stage</b>	
ADRT100	ADRT100 mechanical-bearing direct-drive rotary stage
ADRT150	ADRT150 mechanical-bearing direct-drive rotary stage
ADRT200	ADRT200 mechanical-bearing direct-drive rotary stage
ADRT260	ADRT260 mechanical-bearing direct-drive rotary stage
<b>Stage Height (Required)</b>	
-85	85 mm stage height - Only available for ADRT100
-115	115 mm stage height - Only available for ADRT150
-135	135 mm stage height - Only available for ADRT100 and ADRT150
-155	155 mm stage height - Only available for ADRT200
-160	160 mm stage height - Only available for ADRT260
-180	180 mm stage height - Only available for ADRT150 and ADRT 260
-185	185 mm stage height - Only available for ADRT200
<b>Motor (Required)</b>	
-M1	Low current, -A winding
-M2	Low voltage, -B winding
Note: Only available for ADRT260.	
<b>Feedback (Required)</b>	
-E1	Incremental encoder, 1 Vpp
-E2	Incremental encoder, TTL, x5 interpolation
-E3	Incremental encoder, TTL, x10 interpolation
-E4	Incremental encoder, TTL, x25 interpolation
-E5	Incremental encoder, TTL, x50 interpolation
<b>Connector (Required)</b>	
-CN1	4-pin HPD motor and 25-pin D feedback connectors
-CN2	25-pin D motor and 25-pin D feedback connectors
Note: Only available for ADRT100.	
<b>Rear Seal (Optional)</b>	
-SL	Rear seal
Note: Only available for ADRT100.	
<b>Air Purge (Optional)</b>	
-PR	Air-purge fitting
Note: Only available for ADRT100.	

<b>ADRT Series Direct Drive Rotary Stage (continued)</b>	
<b>Brake (Optional)</b>	
-BK	Holding brake
Note: Only available for the ADRT150 and the ADRT200. Not available with limited travel option.	
<b>Limited Travel (Optional) (1,2)</b>	
-TR010	±5 degrees
-TR020	±10 degrees
-TR040	±20 degrees
-TR060	±30 degrees
-TR080	±40 degrees
-TR090	±45 degrees
-TR100	±50 degrees
-TR120	±60 degrees
-TR140	±70 degrees
-TR160	±80 degrees
-TR180	±90 degrees
-TR200	±100 degrees
-TR220	±110 degrees
-TR240	±120 degrees
-TR260	±130 degrees
-TR270	±135 degrees - Only available on ADRT200 and ADRT260
-TR280	±140 degrees - Only available on ADRT200 and ADRT260
-TR300	±150 degrees - Only available on ADRT200 and ADRT260
(1) Not available with ADRT100.	
(2) Not available with brake option.	
NOTE: -TRxxx options include electrical limits and mechanical hardstops. There are an extra 1.5° per side between the nominal travel and the electrical limits, and an extra 5° per side between the nominal travel and mechanical hardstops. (Ex: -TR90 has ±45° of nominal travel, with ±46.5° of travel between electrical limits and ±50 degrees of travel between mechanical hardstops.)	
<b>Metrology (Required)</b>	
-PL0	No metrology performance plots
-PL1	Uncalibrated with performance plots
-PL2	Calibrated (HALAR) with performance plots

## 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 (50° to 95° 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
<b>Humidity</b>	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.
<b>Altitude</b>	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.
<b>Vibration</b>	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.
<b>Protection Rating</b>	The ADRT stages have limited protection against particles but not liquids. This equates to an ingress protection rating of IP30.
<b>Use</b>	Indoor use only

## 1.2. Accuracy and Temperature Effects

Aerotech products are designed for and built in a 20°C (68°F) environment. Extreme temperature changes could cause a decrease in performance or permanent damage to the ADRT. At a minimum, the environmental temperature must be controlled to within 0.25°C per 24 hours to ensure the ADRT specifications are repeatable over an extended period of time. The severity of temperature effects on all specifications depends on many different environmental conditions, including how the ADRT 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](http://www.aerotech.com) for the most up-to-date information.

**Table 1-3: ADRT Series Specifications (ADRT100 and ADRT150)**

		ADRT100-85	ADRT100-135	ADRT150-115	ADRT150-135	ADRT150-180
Maximum Torque (Continuous)		0.48 N·m	1.6 N·m	2.85 N·m	5.06 N·m	9.29 N·m
Bus Voltage (1)		Up to 340 V				
Accuracy (2)(3)	Uncalibrated	60 arc sec				
	Calibrated	5 arc sec				
Repeatability (3)		3 arc sec				
Axial Error Motion		5 μm				
Radial Error Motion (4)		5 μm				
Tilt Error Motion		10 arc sec				
Height		85 mm	135 mm	115 mm	135 mm	180 mm
Aperture		13 mm			50 mm	
Radial Load (3)		10 kg			25 kg	
Axial Load		15 kg			30 kg	
Rated Speed		1500 rpm			600 rpm	
Inertia		0.00028 kg·m <sup>2</sup>	0.00067 kg·m <sup>2</sup>	0.003379 kg·m <sup>2</sup>	0.004958 kg·m <sup>2</sup>	0.008118 kg·m <sup>2</sup>
Mass		2.0 kg	3.6 kg	5.3 kg	6.9 kg	10.2 kg
Finish (Table)		Hardcoat				
Finish (Stage)		Black Anodized				
<p>(1) Bus voltage for ADRT100 with -25D connector is limited to 160 V.</p> <p>(2) Calibrated accuracy requires -PL2 option and Aerotech controls.</p> <p>(3) Repeatability and accuracy are dependent on encoder resolution. To achieve the listed specifications, encoder resolution must be 0.36 arc sec or finer.</p> <p>(4) Specifications are for single-axis systems ; performance of multi-axis system is payload and workpoint dependent. Consult the Aerotech factory for multi-axis or non-standard applications.</p> <p>(5) Moment load based on 5 year continuous rotation at 250 rpm with maximum axial load applied. Larger moment loads possible for low speed and/or low duty cycle applications. Consult Aerotech for additional information.</p>						

**Table 1-4: ADRT Series Specifications (ADRT200 and ADRT260)**

		ADRT200-155	ADRT200-185	ADRT260-160	ADRT260-180
Maximum Torque (Continuous)		11.12 N·m	15.93 N·m	19.71 N·m	29.09 N·m
Bus Voltage (1)		Up to 340 VDC			
Accuracy (1)(2)	Uncalibrated	60 arc sec			
	Calibrated	5 arc sec			
Repeatability (2)		3 arc sec			
Axial Error Motion		5 $\mu$ m			
Radial Error Motion (3)		5 $\mu$ m			
Tilt Error Motion		10 arc sec			
Height		155 mm		160 mm	
Aperture		75 mm		100 mm	
Radial Load (2)		80 kg		110 kg	
Axial Load		140 kg		170 kg	
Rated Speed		600 rpm		375 rpm	
Inertia		0.020991 kg·m <sup>2</sup>	0.027666 kg·m <sup>2</sup>	0.066488 kg·m <sup>2</sup>	0.08566 kg·m <sup>2</sup>
Mass		13.4 kg	16.7 kg	25.4 kg	30.6 kg
Finish (Table)		Hardcoat			
Finish (Stage)		Black Anodized			
<p>(1) Calibrated accuracy requires -PL2 option and Aerotech controls.</p> <p>(2) Repeatability and accuracy are dependent on encoder resolution. To achieve the listed specifications, encoder resolution must be 0.36 arc sec or finer.</p> <p>(3) Specifications are for single-axis systems ; performance of multi-axis system is payload and workpoint dependent. Consult the Aerotech factory for multi-axis or non-standard applications.</p> <p>(4) Moment load based on 5 year continuous rotation at 250 rpm with maximum axial load applied. Larger moment loads possible for low speed and/or low duty cycle applications. Consult Aerotech for additional information.</p>					

*This page intentionally left blank.*



## Chapter 2: Mechanical Specifications and Installation



**WARNING:** ADRT 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:** Do not attempt to manually lift a stage that is too heavy (in excess of 18 kg). Refer to [Section 1.3](#) for stage mass specifications.

- Do not attempt to manually lift heavy loads single handed.
- With two or more people, only manually lift from the specified surfaces (if lifting hardware hasn't been supplied).
- Lift from the base.
- Do not use any of the cables as lifting points.
- Use a fork lift or cart to transport the stage.



**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 ADRT. Unsecured moving parts may shift and cause bodily injury.
- Improper handling could adversely affect the performance of the ADRT. Use care when moving the ADRT.

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

The ADRT260 exceeds safe single-person lifting and handling specifications. Because of its weight (in excess of 25 kg (55 lbs)), two people should be on hand to carefully lift and move the ADRT260. Lift only by the base and, ideally, lift and move the stage on to a cart to transport the stage to its final location.

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

Before operating the ADRT, 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.

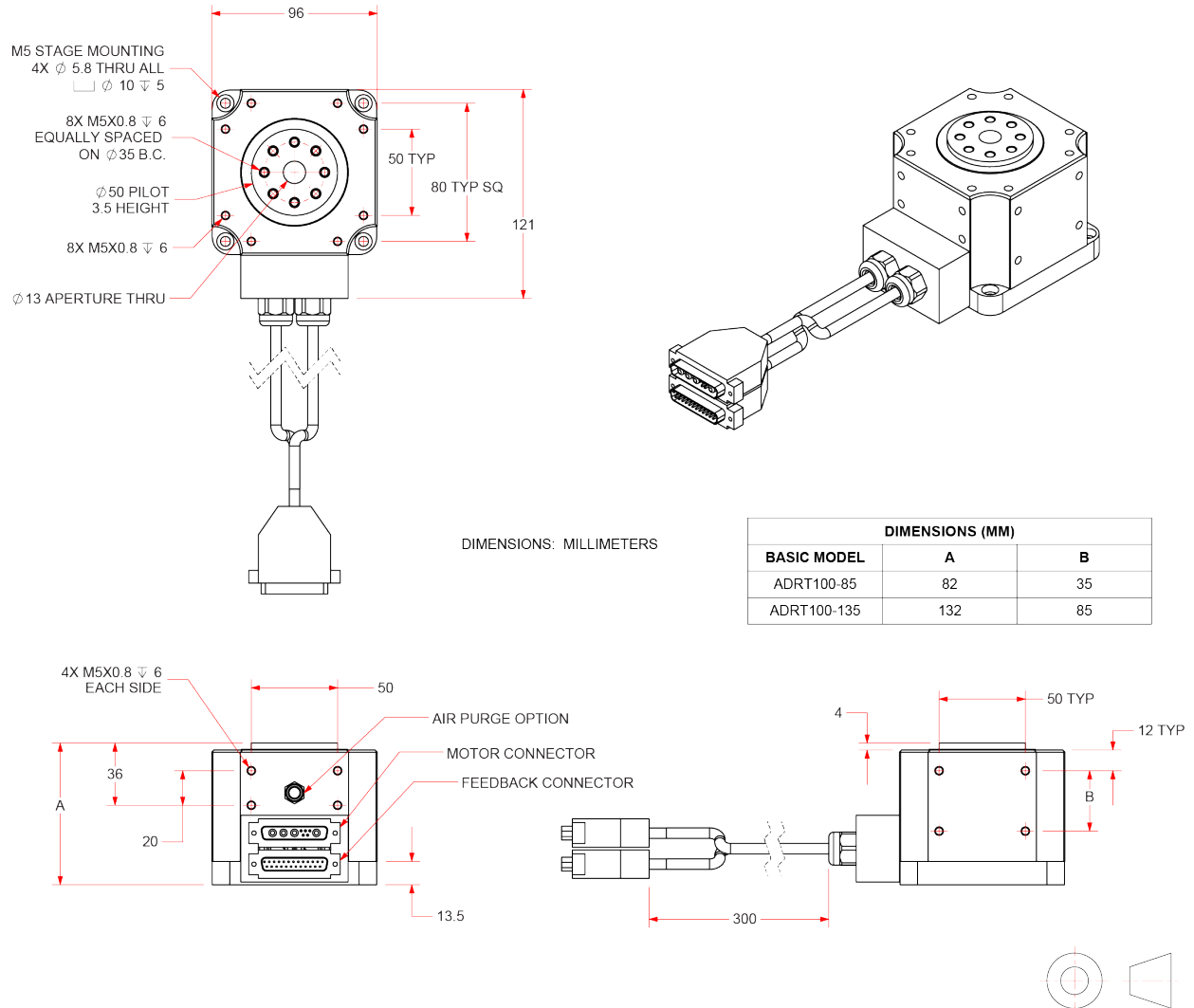
Each ADRT has a label listing the system part number and serial number. These numbers contain information necessary for maintaining or updating system hardware and software. Locate this label and record the information for later reference.

#### Shipping Clamps

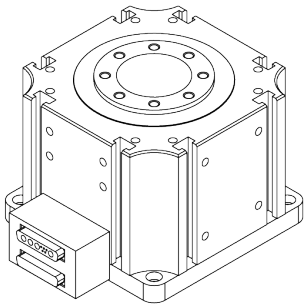
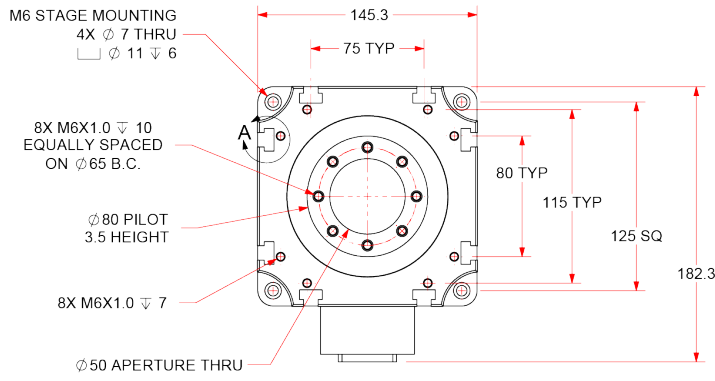
If the ADRT has shipped as part of a system, shipping clamps (typically red, anodized aluminum) may have been installed to secure the system prior to shipment. The shipping clamps, if installed, will need to be removed prior to machine start up.

## 2.2. Dimensions

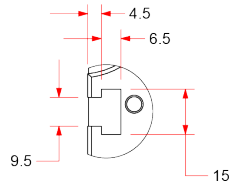
**NOTE:** Aerotech continually improves its product offerings; listed options may be superseded at any time. All drawings and illustrations are for reference only and were complete and accurate as of this manual's release. Refer to [www.aerotech.com](http://www.aerotech.com) for the most up-to-date information.



**Figure 2-1: ADRT100 Dimensions**



DIMENSIONS		
BASIC MODEL	A	B
ADRT150-115	115	60
ADRT150-135	136	80
ADRT150-180	178	120



DETAIL A  
T-SLOT, TYPICAL 8 PLACES

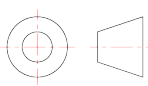
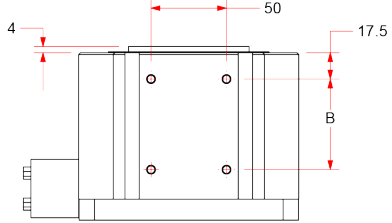
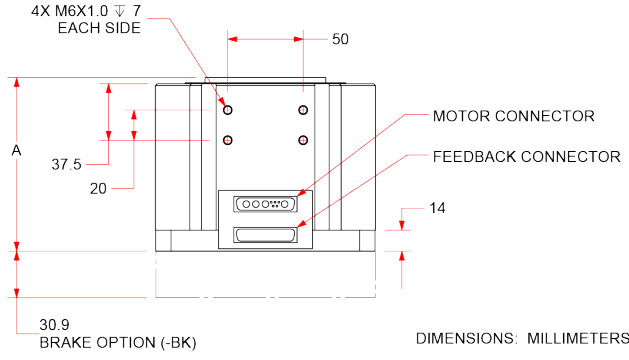
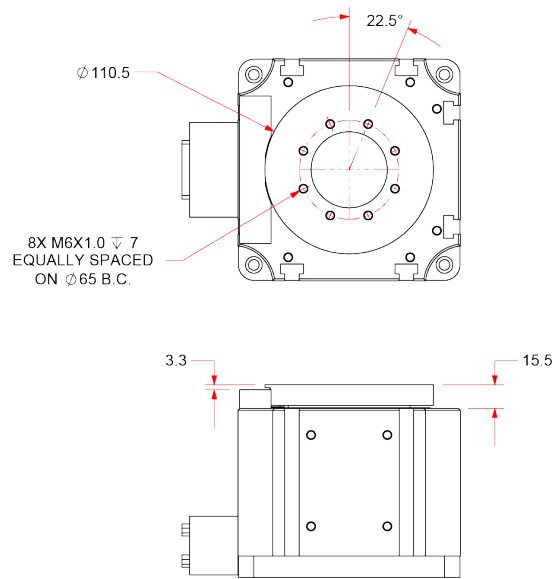
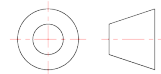


Figure 2-2: ADRT150 Dimensions



ADRT150 LIMITED TRAVEL OPTIONS, UNITS: DEGREES		
OPTION	NOMINAL TRAVEL	HARDSTOP TRAVEL
-TR010	+/- 5	+/- 10
-TR020	+/- 10	+/- 15
-TR040	+/- 20	+/- 25
-TR060	+/- 30	+/- 35
-TR080	+/- 40	+/- 45
-TR090	+/- 45	+/- 50
-TR100	+/- 50	+/- 55
-TR120	+/- 60	+/- 65
-TR140	+/- 70	+/- 75
-TR160	+/- 80	+/- 85
-TR180	+/- 90	+/- 95
-TR200	+/- 100	+/- 105
-TR220	+/- 110	+/- 115
-TR240	+/- 120	+/- 125
-TR260	+/- 130	+/- 135

DIMENSIONS: MILLIMETERS



**Figure 2-3: ADRT150 Limited Travel Dimensions**

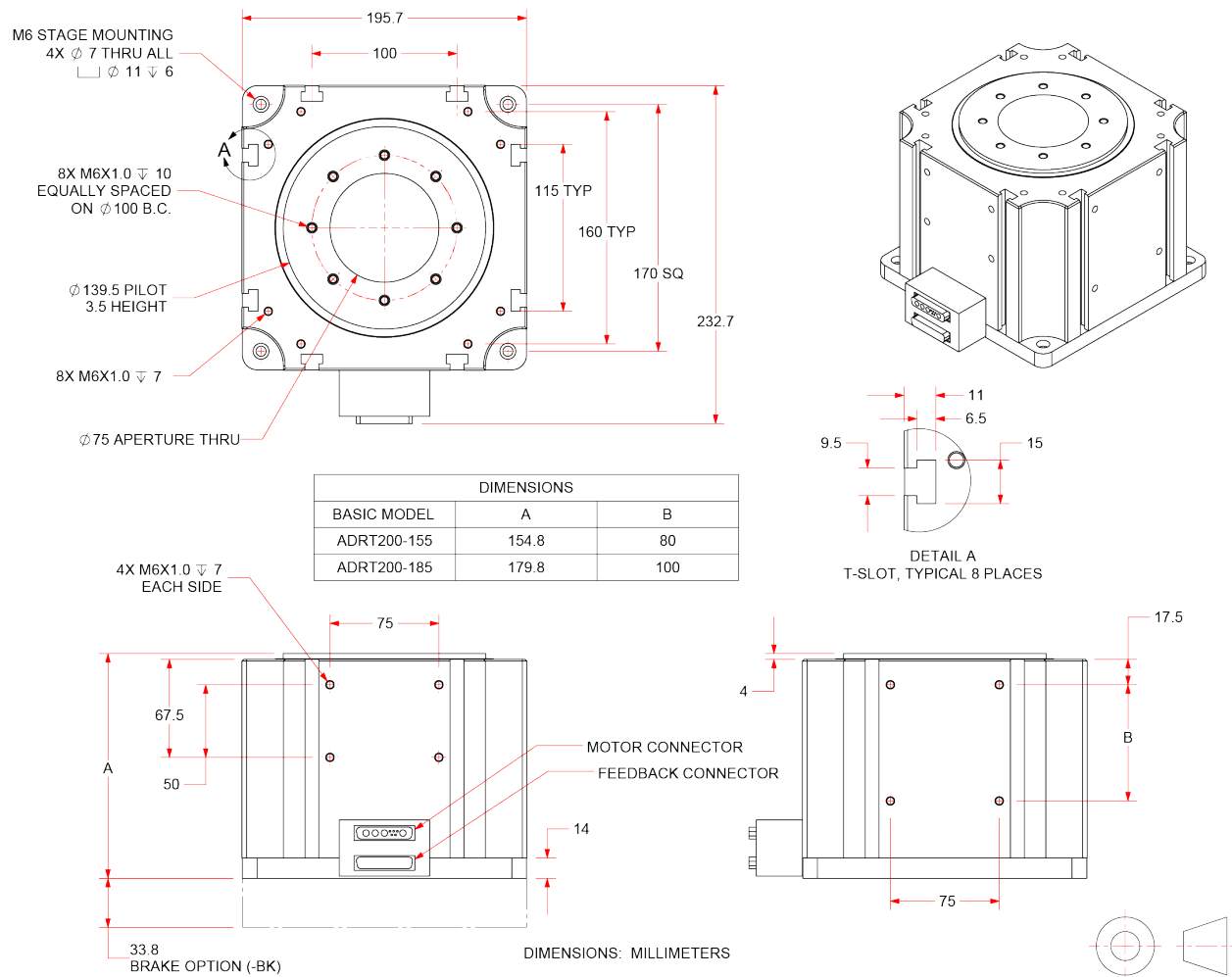
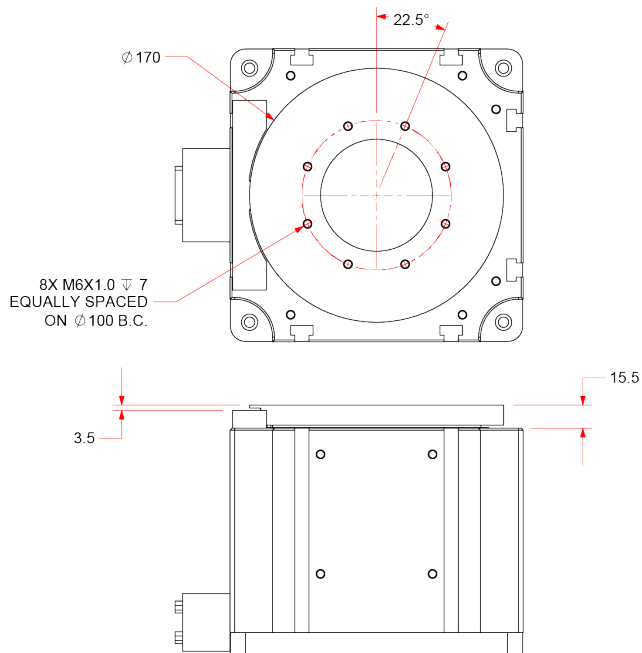


Figure 2-4: ADRT200 Dimensions



ADRT200 LIMITED TRAVEL OPTIONS, UNITS: DEGREES		
OPTION	NOMINAL TRAVEL	HARDSTOP TRAVEL
-TR010	+/- 5	+/- 10
-TR020	+/- 10	+/- 15
-TR040	+/- 20	+/- 25
-TR060	+/- 30	+/- 35
-TR080	+/- 40	+/- 45
-TR090	+/- 45	+/- 50
-TR100	+/- 50	+/- 55
-TR120	+/- 60	+/- 65
-TR140	+/- 70	+/- 75
-TR160	+/- 80	+/- 85
-TR180	+/- 90	+/- 95
-TR200	+/- 100	+/- 105
-TR220	+/- 110	+/- 115
-TR240	+/- 120	+/- 125
-TR260	+/- 130	+/- 135
-TR270	+/- 135	+/- 140
-TR280	+/- 140	+/- 145
-TR300	+/- 150	+/- 155

DIMENSIONS: MILLIMETERS

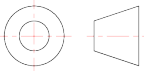


Figure 2-5: ADRT200 Limited Travel Dimensions

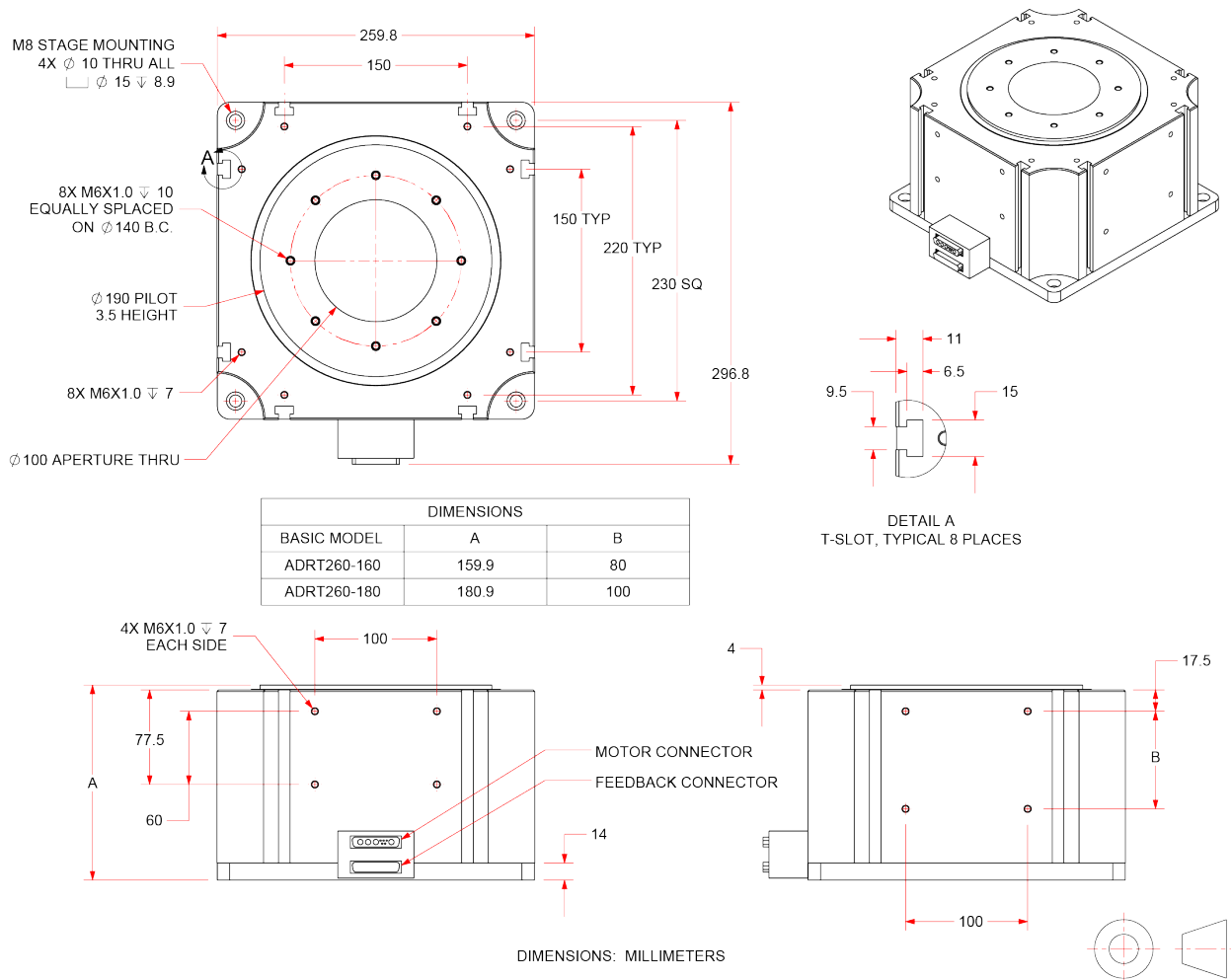
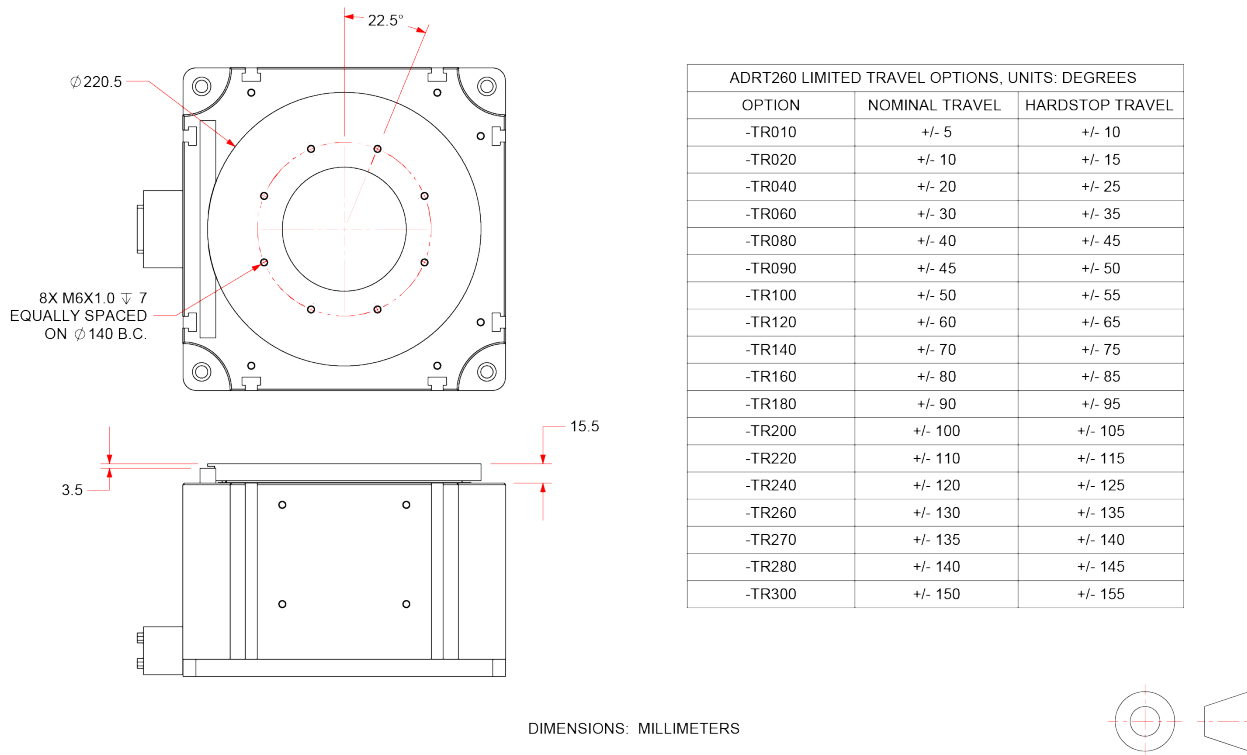


Figure 2-6: ADRT260 Dimensions



**Figure 2-7: ADRT260 Limited Travel Dimensions**



## 2.3. Securing the Stage to the Mounting Surface



**WARNING:** The ADRT 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 ADRT. Unsecured moving parts may shift and cause bodily injury.

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

**NOTE:** To maintain accuracy, the mounting surface must be flat to within 13  $\mu\text{m}$ .

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

ADRT series stages have a fixed mounting pattern (as shown in [Figure 2-8](#)).

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
Top Mounting	<b>ADRT100:</b> M5 SHCS	4 N·m
	<b>ADRT150, 200:</b> M6 SHCS	7 N·m
	<b>ADRT260:</b> M8 SHCS	17 N·m
Side Mounting	<b>ADRT100:</b> M5-0.7 x 5.0 tapped holes	4 N·m
	<b>ADRT150, 200, 260:</b> M6-1.0 x 6.0 tapped holes	7 N·m

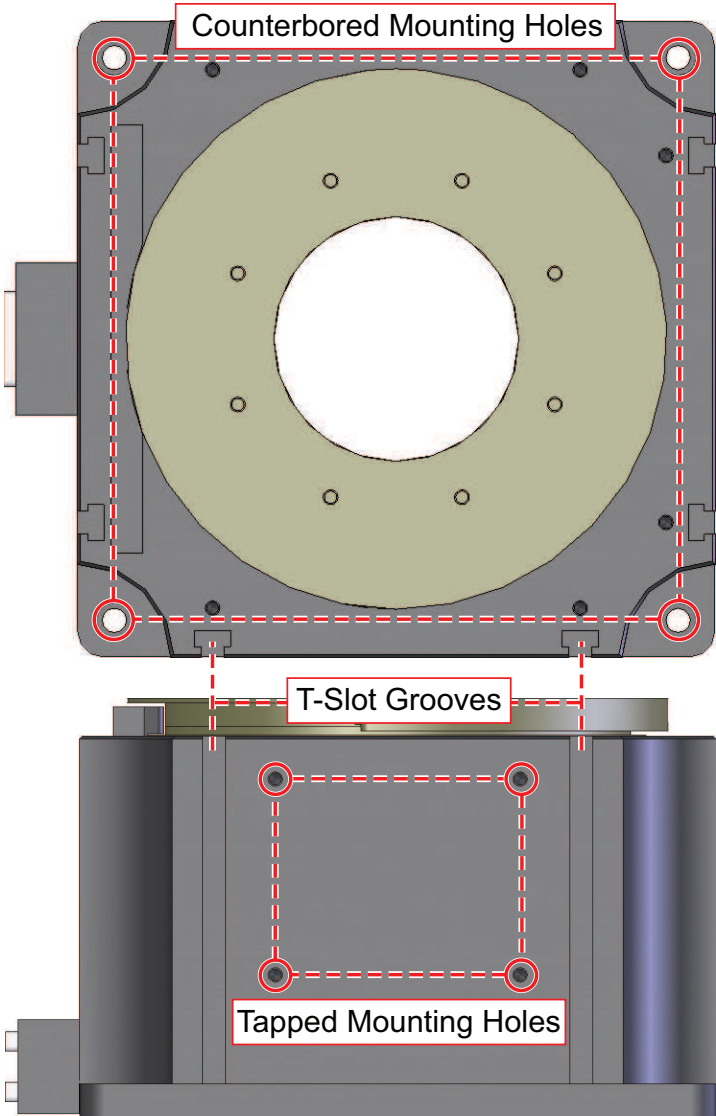


Figure 2-8: Mounting Holes Locations

## 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 acetone or isopropyl alcohol and allow the cleaning solvent to completely dry.

Aerotech recommends that customers use a representative payload during start-up to prevent accidental damage to the stage and the payload. Proceed with the electrical installation and test the motion control system in accordance with the system documentation. Document all results for future reference. For information on electrical installation refer to [Chapter 3](#) and the documentation delivered with the stage.

**NOTE:** If your ADRT was purchased with Aerotech controls, it might have been tuned with a representative payload based on the information provided at the time of order. If the ADRT is started up without a payload, the servo gains provided by Aerotech with the shipment may not be appropriate and servo instability can occur. Refer to the controller help file for tuning assistance.

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

**NOTE:** For valid system performance, the mounting interface should be flat within 13  $\mu\text{m}$ .



**WARNING:** Refer to the dimensions in [Section 2.2](#) for maximum allowable thread engagement. A screw extending through the stage table can affect travel and damage the stage.

### 2.4.1. Load Capability

Applied loads should be symmetrically distributed whenever possible (i.e., the payload should be centered on the stage table and the entire stage should be centered on the support structure).

If cantilevered loads are applied, refer to [Figure 2-9](#) to find the loading condition. Refer to [Figure 2-10](#) through [Figure 2-13](#) to find the maximum allowable load.

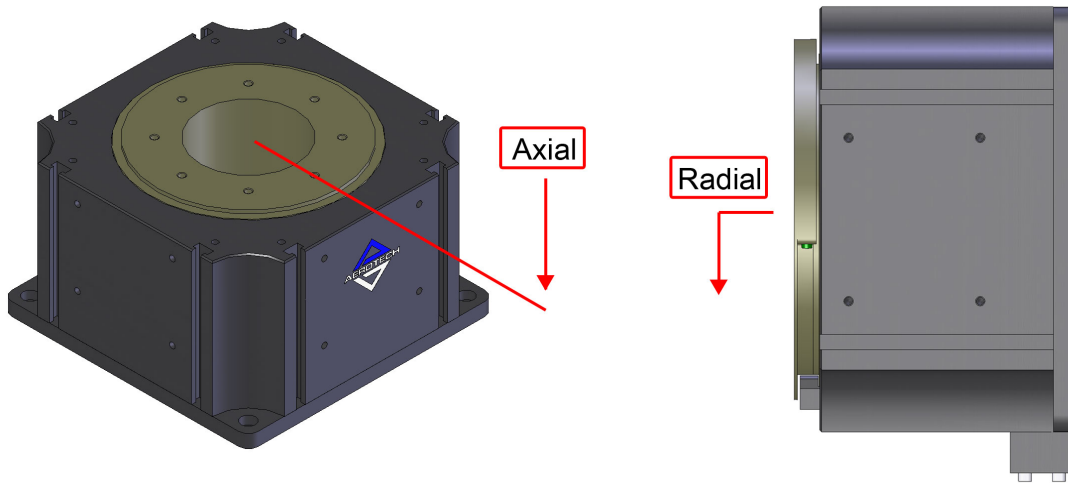


Figure 2-9: Load Orientations

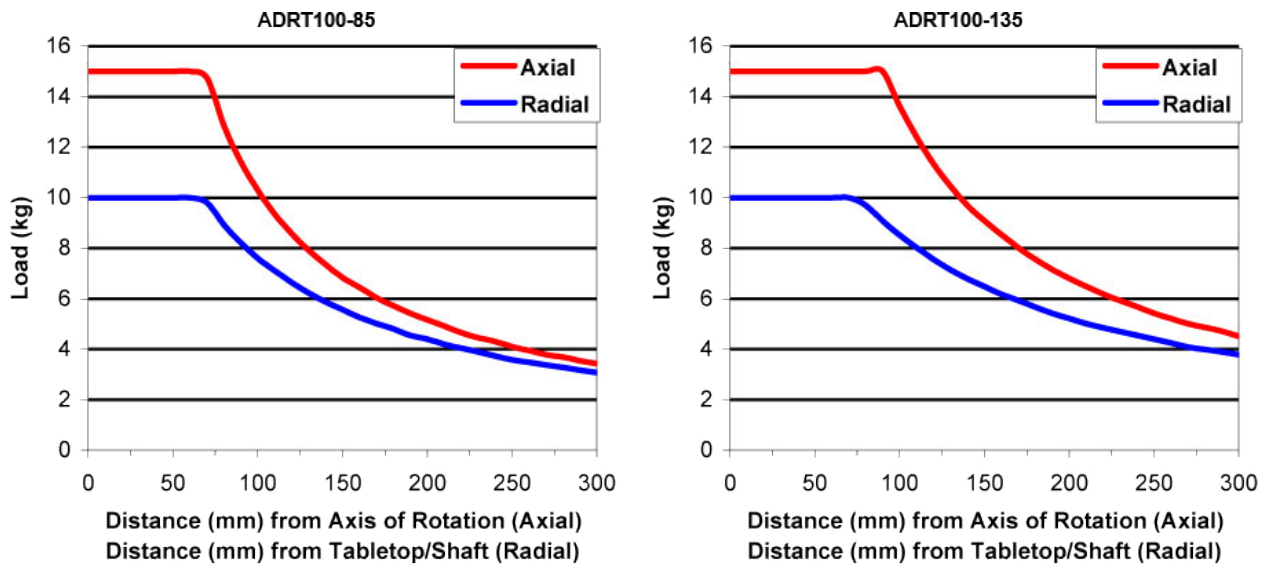


Figure 2-10: ADRT100 Cantilevered Load Capability

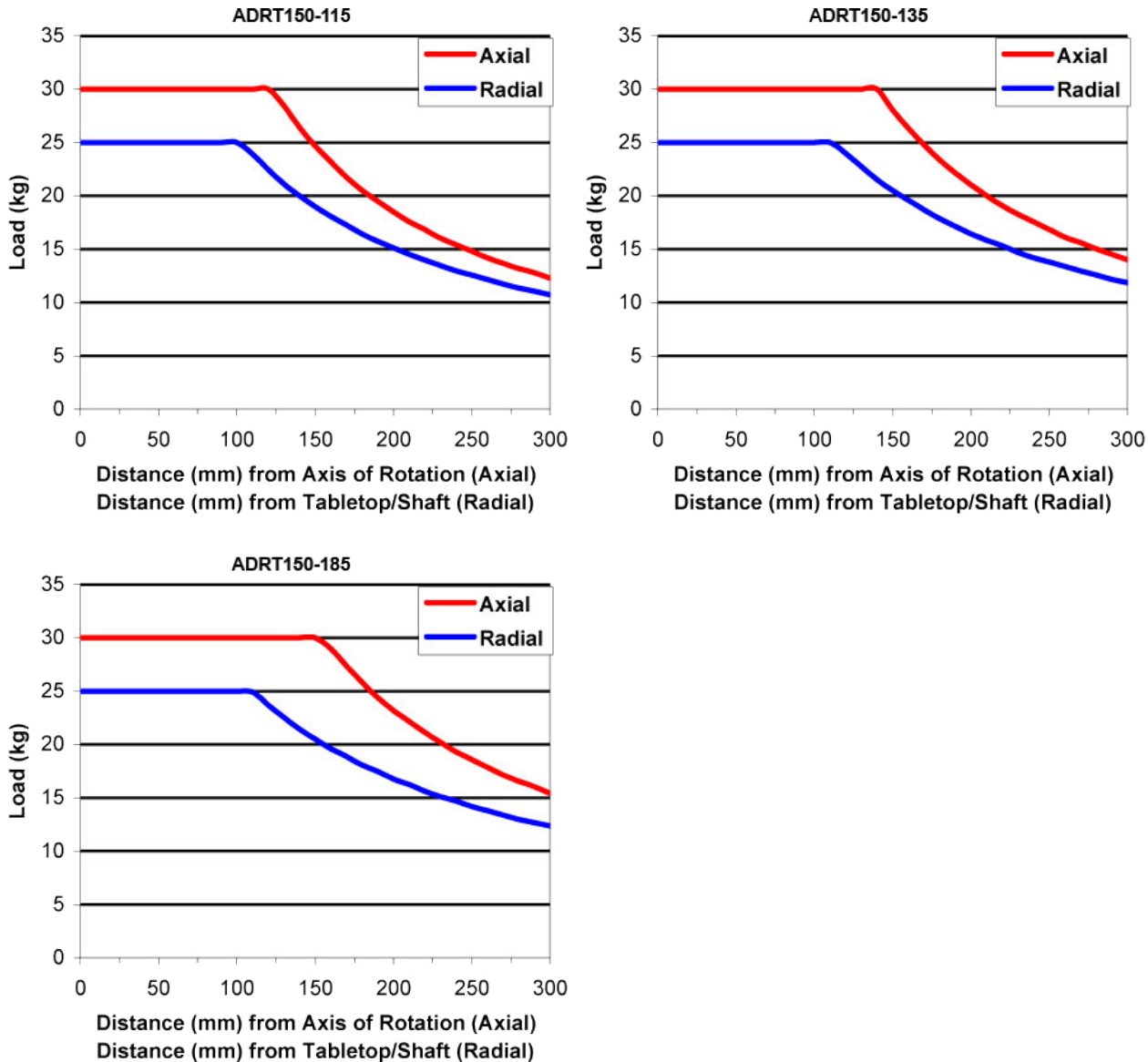
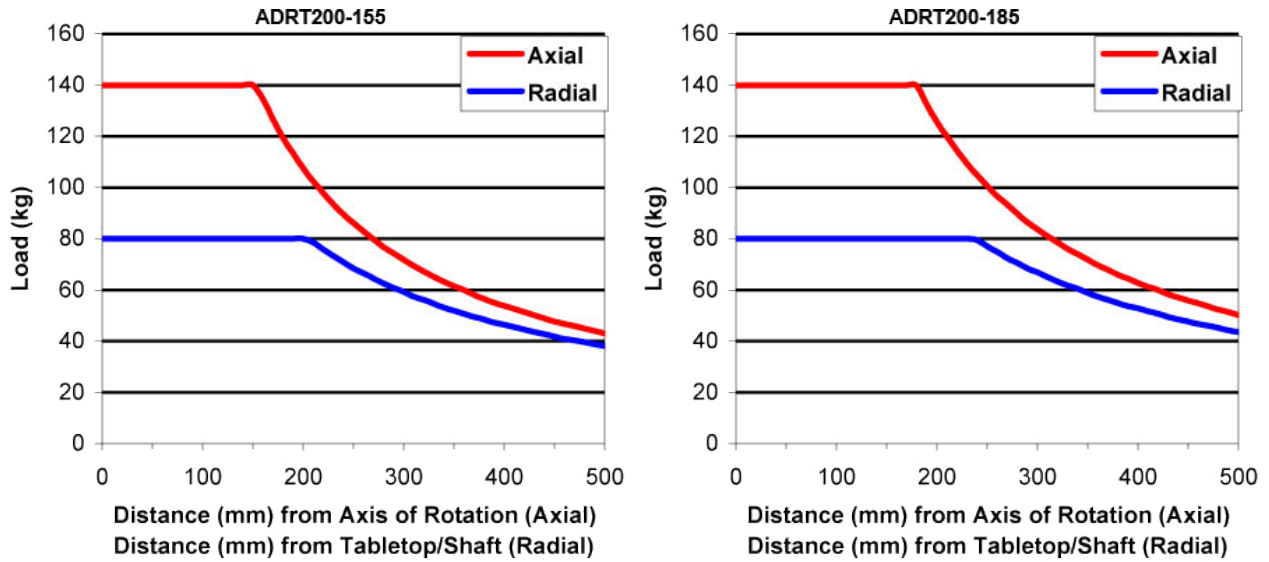
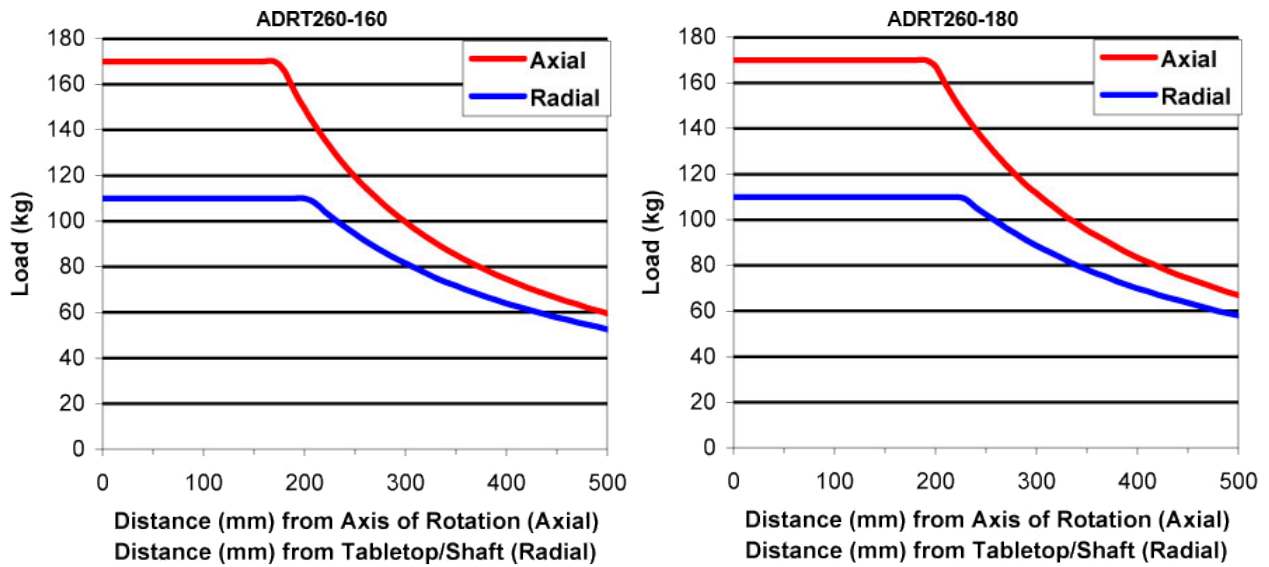


Figure 2-11: ADRT150 Cantilevered Load Capability



**Figure 2-12: ADRT200 Cantilevered Load Capability**



**Figure 2-13: ADRT260 Cantilevered Load Capability**

## 2.5. Travel Adjustment

### 2.5.1. Optical Limit Adjustment

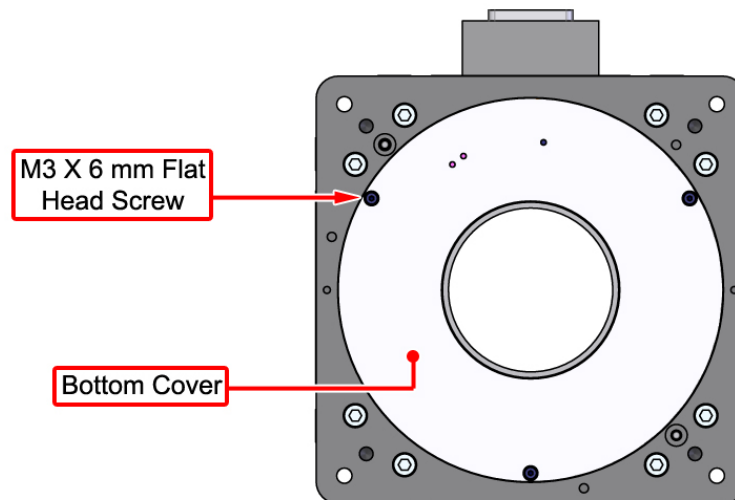
Stages with the limited travel option have the optical limits set at the factory prior to shipment. However, you can adjust the optical limits if needed. Consult the factory if more information is required.



**WARNING:** Do not adjust the hard stops to an angle smaller than the stage's limit travel. Doing so could result in damage to the stage and payload and the possibility of bodily injury. Maintain at least  $\pm 5^\circ$  of travel between the optical limits and the hard stops. You should leave enough overtravel between the electrical limit and the hard stop for the stage to completely decelerate and stop before impacting the hard stop.

The following procedure describes how to adjust the optical limits.

1. Disconnect all electrical power from stage.
2. Remove the [QTY. 3] M3 flat head screws to remove bottom cover from stage (refer to [Figure 2-14](#)). Disconnect optical limit board wires.
3. Loosen the [QTY. 4] M3 button head cap screws (two per limit flag) and slide each limit flag along the bolt circle to the desired half-limit travel. Depending on the amount of adjustment required, you might have to remove these screws and slide the limit flags to the desired half-limit travel positions. Note that the optical limit centerline passes through the centers of the two optical sensors on the optical limit board.
4. Once the limit flags are placed for the desired half-limit travel, re-tighten or reinsert [QTY. 2] M3 button head cap screws per limit flag. Make sure limit flags are fastened securely.
5. Reconnect the optical limit board wires and reattach the bottom cover to the stage with [QTY. 3] M3 flat head screws.
6. Prior to operating the stage, manually test the optical limit adjustment to ensure that the optical limits trip at the desired half-limit travels.



**Figure 2-14: Bottom View of the ADRT**

[Figure 2-15](#) shows the bottom view of the ADRT with the bottom cover hidden for clarity. An optical half-limit travel of  $30^\circ$  is shown for reference.

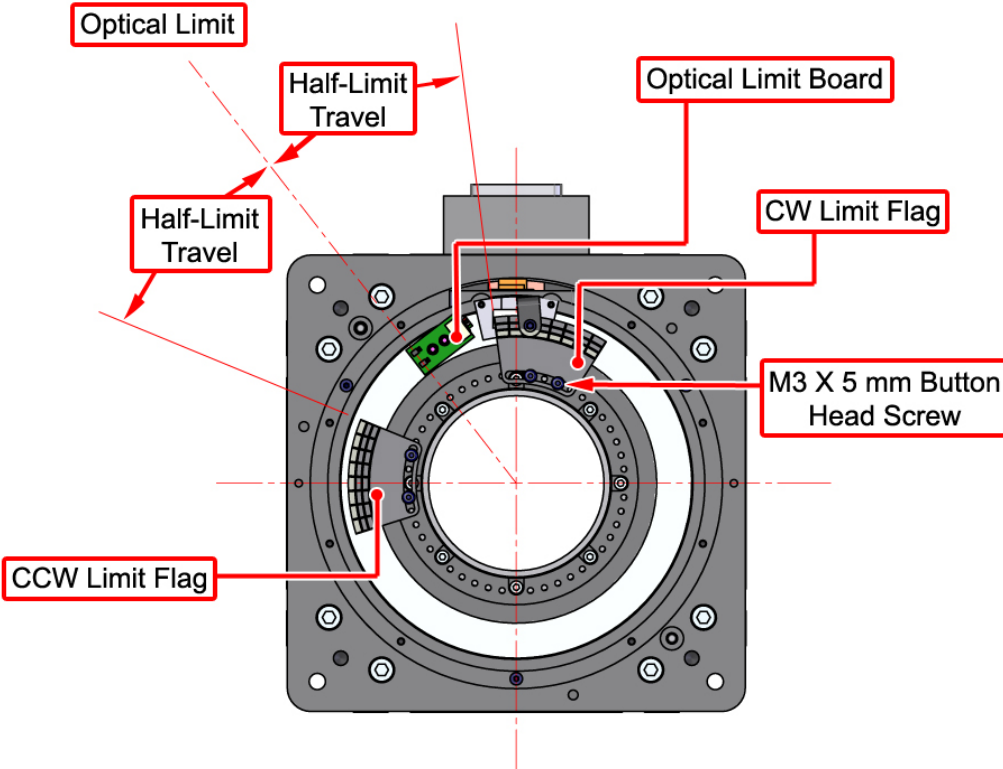


Figure 2-15: ADRT Limit Flag Adjustment



**2.5.2. Hard Stop Adjustment**

Hard stop locations are set via bolt-on table tops. If hard stop travel adjustment is required, contact your Aerotech representative to purchase alternate table top(s).

*This page intentionally left blank.*

## Chapter 3: Electrical 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 ADRT 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 ADRT is part of a complete Aerotech motion control system, setup usually involves connecting the ADRT 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:** Operator access to the base and tabletop must be restricted while connected to a power source. Failure to do so may cause electric shock.



**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:** 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.

### 3.1. Motor and Feedback Connectors

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

**NOTE:** Refer to the other documentation accompanying your Aerotech equipment. Call your Aerotech representative if there are any questions on system configuration.

The protective ground connection of the ADRT 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.

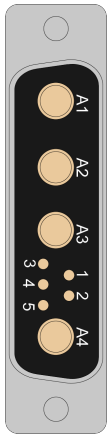


**WARNING:** Operator access to the base and tabletop must be restricted while connected to a power source. Failure to do so may cause electric shock.



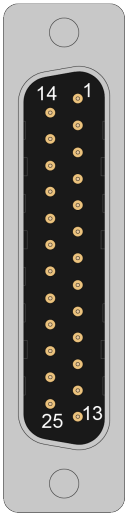
**CAUTION:** The stage controller must provide over-current and over-speed protection. Failure to do so may result in permanent damage to the motor and stage components.

**Table 3-1: 4-Pin Motor Connector Pin Assignments**

Pin	Description	Connector
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)	

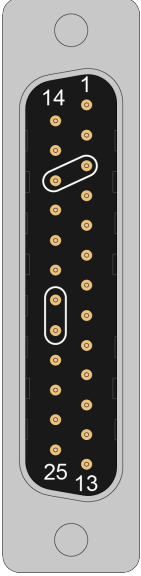
Mating Connector	Aerotech P/N	Third Party P/N
Backshell	ECK00656	Amphenol #17E-1726-2
Sockets [QTY. 4]	ECK00659	ITT Cannon #DM53744-6
Connector	ECK00657	ITT Cannon #DBM9W4SA197

**Table 3-2: 25-Pin Motor Connector Pin Assignments (ADRT100 Only)**

Pin	Description	Connector
11	Motor Phase A	
12		
13		
24		
25		
8	Motor Phase B	
9		
20		
21		
22		
4	Motor Phase C	
5		
6		
17		
18		
CASE	Frame ground (motor protective ground)	
2		
14		
15		

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

**Table 3-3: 25-Pin Feedback Connector Pin Assignments**

Pin	Description	Connector
1	Reserved	
2	Over-Temperature Thermistor sensor	
3	+5 V power supply	
4	Reserved	
5	Hall Effect sensor, phase B	
6	Marker-N	
7	Marker	
8	Reserved	
9	Reserved	
10	Hall Effect sensor, phase A	
11	Hall Effect sensor, phase C	
12	Option: Signal indicating maximum travel produced by positive/CW stage direction	
13	Option: Brake -	
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	Option: Signal indicating stage maximum travel produced by negative/CCW stage direction	
25	Option: Brake +	

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

All motor and controller manufacturers have their own designations for motor phases A/B/C and Hall signals A/B/C (refer to Section 3.5. for motor phasing). Shielded cables are required for the motor and feedback connections.

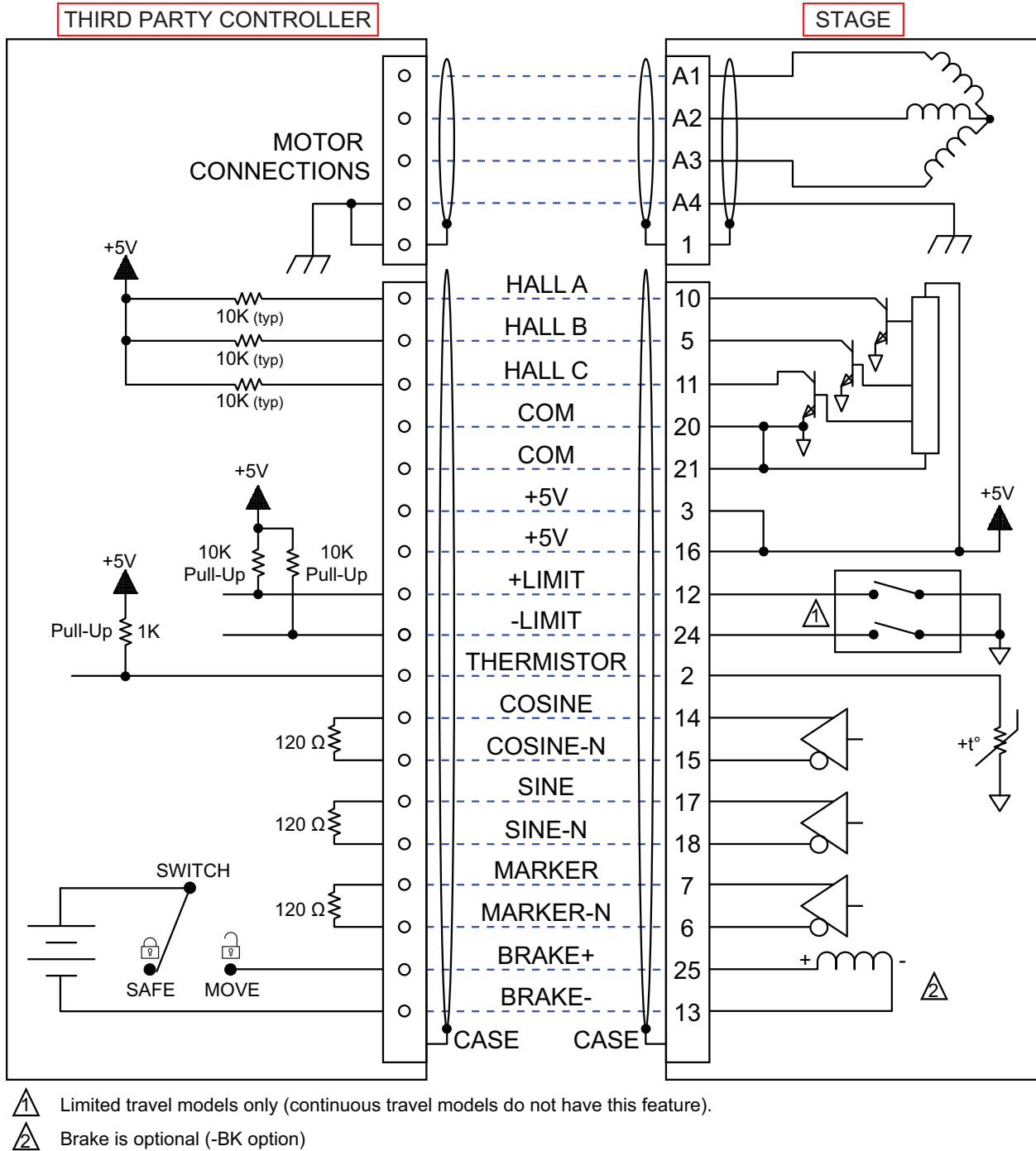


Figure 3-1: Motor and Feedback Wiring

### 3.3. Motor and Feedback Specifications

**Table 3-4: Feedback Specifications**

Hall-Effect Sensors Specifications	
Supply Voltage	5 V $\pm$ 5%
Supply Current	50 mA
Output Type	Open Collector
Output Voltage	24 V max (pull up)
Output Current	5 mA (sinking)

Thermistor Specifications	
Polarity	Logic "0" (no fault)
	Logic "1" (over-temperature fault)
Cold Resistance	$\sim$ 100 $\Omega$
Hot Resistance	$\sim$ 10 K
<b>Note:</b> 1K pull-up to +5V recommended.	

Encoder Specifications	
Supply Voltage	5 V $\pm$ 10%
Supply Current	Sine: 50 mA Digital: 150 mA
Output Signals	<b>Sinusoidal Type (Incremental Encoder):</b> 1 V <sub>pk-pk</sub> into 120 $\Omega$ Load (differential signals SIN+, SIN-, COS+, COS- are .5 V <sub>pk-pk</sub> relative to ground.)
	<b>Digital Output (Incremental Encoder):</b> RS422/485 compatible

Limit Switch Specifications		
Supply Voltage	5 V	8-24 V (-24V option)
Supply Current	25 mA	
Output Types	Open Collector (sinking) High-Side Switch (-SRCE option)	
Output Current	10 mA	
Output Polarity	Normally Closed <ul style="list-style-type: none"> <li>Sinks current to ground (Logic "0") when not in limit</li> <li>High impedance (Logic "1") when in limit</li> <li>Requires external pull-up to +5 V (10 k<math>\Omega</math> recommended)</li> </ul>	
	Normally Open (-NOP option) <ul style="list-style-type: none"> <li>Source current (Logic "1") when not in limit</li> <li>High impedance (Logic "0") when in limit</li> </ul>	
<b>Note:</b> If the ADRT is driven beyond the electrical limit, it will encounter a mechanical stop. Impacting the mechanical stop could cause damage to the stage even at low speeds.		

Brake Specifications	
Brake Supply Voltage	24 VDC
Brake Supply Current (typical) <sup>(1)</sup>	ADRT150 = 615 mA ADRT200 = 470 mA
(1) Current through the brake coil is required to release the brake and allow motion.	



**Table 3-5: Encoder Specifications**

Model	ADRT100 / ADRT150	ADRT200 / ADRT260
Fundamental Resolution	3600 Lines/Rev	5400 Lines/Rev
-E1 <sup>(1)</sup>	0.09/0.0225 arc sec/line	0.06/0.015 arc sec/line
-E2	18 arc sec/line	12 arc sec/line
-E3	9 arc sec/line	6 arc sec/line
-E4	3.6 arc sec/line	2.4 arc sec/line
-E5	1.8 arc sec/line	1.2 arc sec/line
1. -E1 shows x4000 / x16000 total interpolation 2. Quadrature decoding included in interpolated resolution calculations		

**Table 3-6: Maximum Speeds for the Encoder Option**

Model	ADRT100	ADRT150	ADRT200	ADRT260
-E1/-E2/-E3/-E4	1500 rpm	600 rpm	600 rpm	375 rpm
-E5	800 rpm	600 rpm	500 rpm	375 rpm

**NOTE:** The encoders used on all ADRT series stages come standard with a 16 MHz clock rate. Aerotech can provide slower or faster clock rates to match the controller being used. Consult Aerotech for more information.

**Table 3-7: ADRT100 Motor Specifications (S-76-xx Rotary Motor)**

		S-76-35 (ADRT100-85)	S-76-85 (ADRT100-135)
<b>Performance Specifications (1,5)</b>			
Winding Designation		-A	-A
Stall Torque, Cont. (2)	N·m	0.48	1.94
Peak Torque (3)	N·m	1.92	7.75
<b>Electrical Specifications (5)</b>			
Winding Designation		-A	-A
BEMF Const., line-line, Max	$V_{pk}/krpm$	29.1	68.9
Continuous Current, Stall (2)	$A_{pk}$	2.0	3.80
	$A_{rms}$	1.4	2.7
Peak Current, Stall (2)	$A_{pk}$	8.0	15.2
	$A_{rms}$	5.7	10.7
Torque Constant (4, 9)	$N·m/A_{pk}$	0.24	0.51
	$N·m/A_{rms}$	0.34	0.72
Motor Constant (2, 4)	$N·m/\sqrt{W}$	0.075	0.216
Resistance, 25°C, line-line	$\Omega$	10.5	5.7
Inductance, line-line	mH	1.40	1.10
Maximum Bus Voltage	$V_{DC}$	340 (-HPD) 160 (-25D)	340 (-HPD) 160 (-25D)
Thermal Resistance	$^{\circ}C/W$	1.83	0.93
Number of Poles	--	14	14
<p>1. Performance is dependent upon heat sink configuration, system cooling conditions, and ambient temperature</p> <p>2. Values shown @ 75°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</p> <p>3. Peak force assumes correct rms current; consult Aerotech.</p> <p>4. Torque constant and motor constant specified at stall</p> <p>5. All performance and electrical specifications <math>\pm 10\%</math></p> <p>6. Specifications given are for the motor only. When integrated into a housing with bearings additional losses should be considered.</p> <p>7. Maximum winding temperature is 100 °C (thermistor trips at 100 °C)</p> <p>8. Ambient operating temperature range 0 °C - 25 °C; consult Aerotech for performance in elevated ambient temperatures</p> <p>9. All Aerotech amplifiers are rated <math>A_{pk}</math>; use torque constant in <math>N·m/A_{pk}</math> when sizing</p>			

**Table 3-8: ADRT150 Motor Specifications (S-130-xx Rotary Motor)**

		S-130-39 (ADRT150-115)	S-130-60 (ADRT150-135)	S-130-102 (ADRT150-180)
<b>Performance Specifications (1,5)</b>				
Winding Designation		-A	-A	-A
Stall Torque, Cont. (2)	N·m	2.85	5.06	9.29
Peak Torque (3)	N·m	11.39	20.22	37.18
<b>Electrical Specifications (5)</b>				
Winding Designation		-A	-A	-A
BEMF Const., line-line, Max	$V_{pk}/krpm$	90.7	180.0	363.0
Continuous Current, Stall (2)	$A_{pk}$	3.8	3.4	3.1
	$A_{rms}$	2.7	2.4	2.2
Peak Current, Stall (2)	$A_{pk}$	15.2	13.6	12.4
	$A_{rms}$	10.7	9.6	8.8
Torque Constant (4, 9)	$N·m/A_{pk}$	0.75	1.49	3.00
	$N·m/A_{rms}$	1.06	2.10	4.24
Motor Constant (2, 4)	$N·m/\sqrt{W}$	0.321	0.539	0.859
Resistance, 25°C, line-line	$\Omega$	5.6	7.8	12.5
Inductance, line-line	mH	1.70	1.80	3.67
Maximum Bus Voltage	$V_{DC}$	340	340	340
Thermal Resistance	$^{\circ}C/W$	0.95	0.85	0.64
Number of Poles	--	18	18	18
<p>1. Performance is dependent upon heat sink configuration, system cooling conditions, and ambient temperature</p> <p>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</p> <p>3. Peak force assumes correct rms current; consult Aerotech.</p> <p>4. Torque constant and motor constant specified at stall</p> <p>5. All performance and electrical specifications <math>\pm 10\%</math></p> <p>6. Specifications given are for the motor only. When integrated into a housing with bearings additional losses should be considered.</p> <p>7. Maximum winding temperature is 100 °C (thermistor trips at 100 °C)</p> <p>8. Ambient operating temperature range 0 °C - 25 °C; consult Aerotech for performance in elevated ambient temperatures</p> <p>9. All Aerotech amplifiers are rated <math>A_{pk}</math>; use torque constant in <math>N·m/A_{pk}</math> when sizing</p>				

**Table 3-9: ADRT200 Motor Specifications (S-180-xx Rotary Motor)**

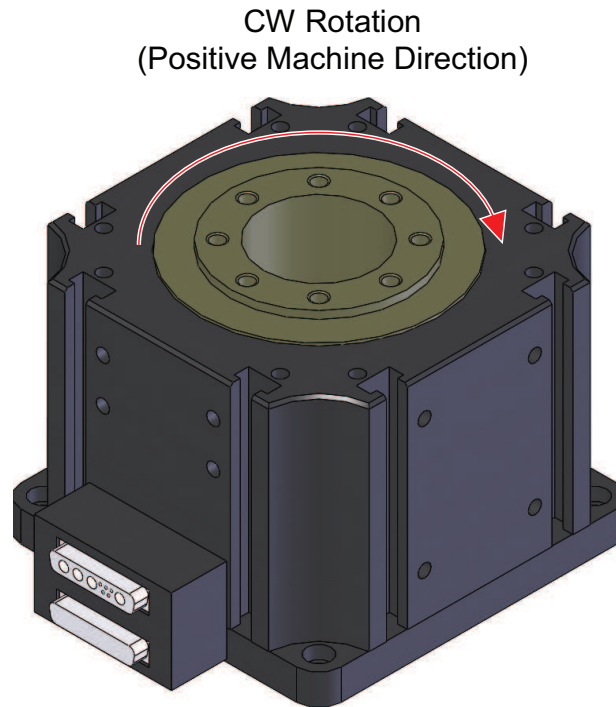
		S-180-69 (ADRT200-155)	S-180-94 (ADRT200-185)
<b>Performance Specifications (1,5)</b>			
Winding Designation		-A	-A
Stall Torque, Cont. (2)	N·m	11.12	15.93
Peak Torque (3)	N·m	44.47	63.70
<b>Electrical Specifications (5)</b>			
Winding Designation		-A	-A
BEMF Const., line-line, Max	$V_{pk}/krpm$	263.9	393.4
Continuous Current, Stall (2)	$A_{pk}$	5.1	4.9
	$A_{rms}$	3.6	3.5
Peak Current, Stall (2)	$A_{pk}$	20.4	19.6
	$A_{rms}$	14.4	13.9
Torque Constant (4, 9)	$N·m/A_{pk}$	2.18	3.25
	$N·m/A_{rms}$	3.08	4.60
Motor Constant (2, 4)	$N·m/\sqrt{W}$	1.053	1.391
Resistance, 25°C, line-line	$\Omega$	4.4	5.6
Inductance, line-line	mH	1.70	2.60
Maximum Bus Voltage	$V_{DC}$	340	340
Thermal Resistance	$^{\circ}C/W$	0.67	0.57
Number of Poles	--	18	18
<p>1. Performance is dependent upon heat sink configuration, system cooling conditions, and ambient temperature</p> <p>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</p> <p>3. Peak force assumes correct rms current; consult Aerotech.</p> <p>4. Torque constant and motor constant specified at stall</p> <p>5. All performance and electrical specifications <math>\pm 10\%</math></p> <p>6. Specifications given are for the motor only. When integrated into a housing with bearings additional losses should be considered.</p> <p>7. Maximum winding temperature is 100 °C (thermistor trips at 100 °C)</p> <p>8. Ambient operating temperature range 0 °C - 25 °C; consult Aerotech for performance in elevated ambient temperatures</p> <p>9. All Aerotech amplifiers are rated <math>A_{pk}</math>; use torque constant in <math>N·m/A_{pk}</math> when sizing</p>			

**Table 3-10: ADRT260 Motor Specifications (S-240-xx Rotary Motor)**

		S-240-63 (ADRT260-160)		S-240-83 (ADRT260-180)	
<b>Performance Specifications (1,5)</b>					
Winding Designation		A	B	A	B
Stall Torque, Cont. (2)	N·m	19.71		29.09	
Peak Torque (3)	N·m	78.82		116.37	
<b>Electrical Specifications (5)</b>					
Winding Designation		A	B	A	B
BEMF Const., line-line, Max	$V_{pk}/krpm$	404.3	202.2	607.2	303.6
Continuous Current, Stall (2)	$A_{pk}$	5.9	11.8	5.8	11.6
	$A_{rms}$	4.2	8.3	4.1	8.2
Peak Current, Stall (2)	$A_{pk}$	23.6	47.2	23.2	46.4
	$A_{rms}$	16.7	33.4	16.4	32.8
Torque Constant (4, 9)	$N·m/A_{pk}$	3.34	1.67	5.02	2.51
	$N·m/A_{rms}$	4.72	2.36	7.09	3.55
Motor Constant (2, 4)	$N·m/\sqrt{W}$	1.405	1.405	1.893	1.893
Resistance, 25°C, line-line	$\Omega$	5.8	1.5	7.2	1.8
Inductance, line-line	mH	2.90	0.73	4.30	1.08
Maximum Bus Voltage	$V_{DC}$	340		340	
Thermal Resistance	$^{\circ}C/W$	0.38		0.32	
Number of Poles	--	26		26	
<p>1. Performance is dependent upon heat sink configuration, system cooling conditions, and ambient temperature</p> <p>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</p> <p>3. Peak force assumes correct rms current; consult Aerotech.</p> <p>4. Torque constant and motor constant specified at stall</p> <p>5. All performance and electrical specifications <math>\pm 10\%</math></p> <p>6. Specifications given are for the motor only. When integrated into a housing with bearings additional losses should be considered.</p> <p>7. Maximum winding temperature is 100 °C (thermistor trips at 100 °C)</p> <p>8. Ambient operating temperature range 0 °C - 25 °C; consult Aerotech for performance in elevated ambient temperatures</p> <p>9. All Aerotech amplifiers are rated <math>A_{pk}</math>; use torque constant in <math>N·m/A_{pk}</math> when sizing</p>					

### 3.4. Limits, Marker, and 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 3-2](#) shows the machine direction of ADRT stages.



**Figure 3-2: Machine Direction**

### 3.5. Motor and Feedback Phasing

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

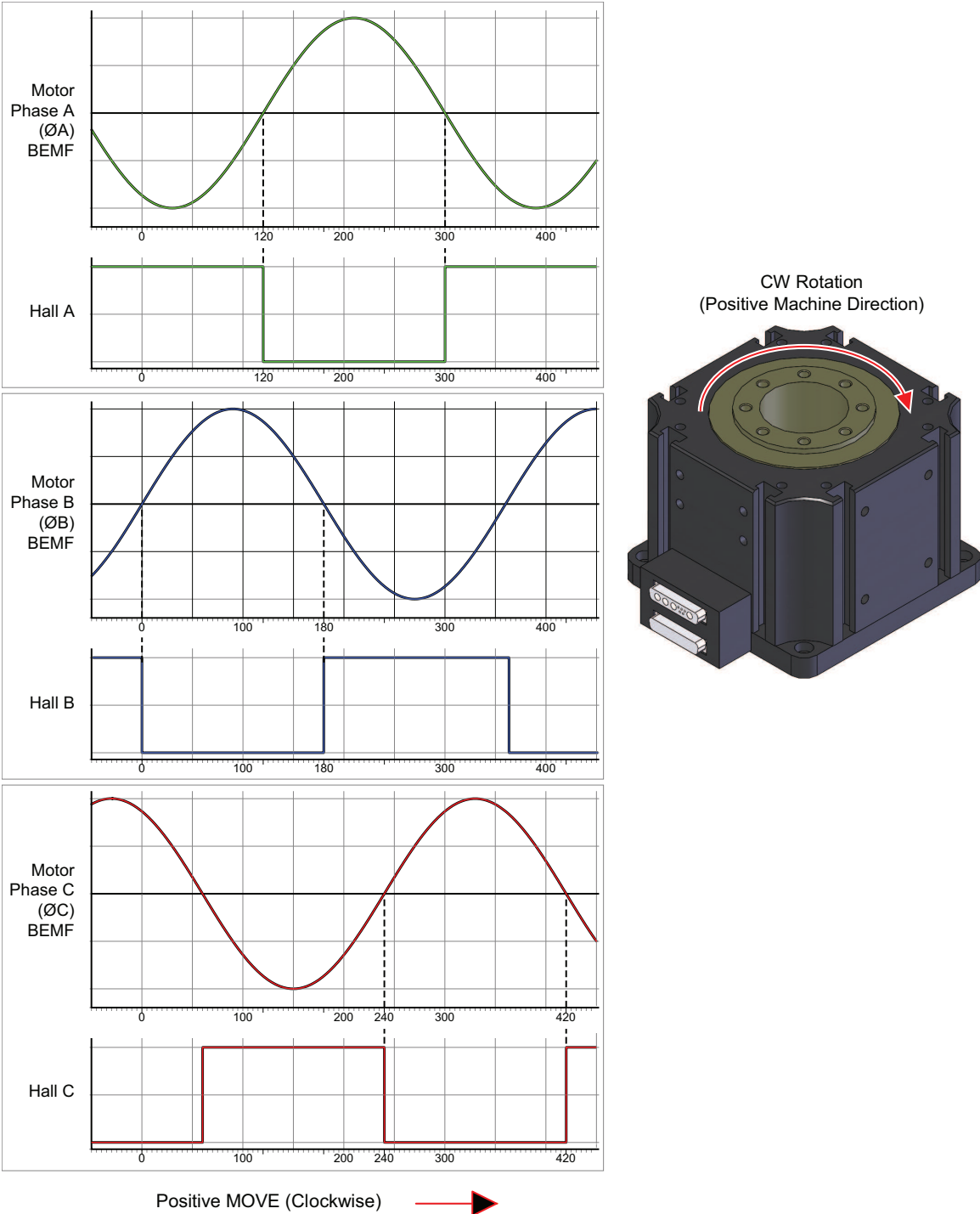
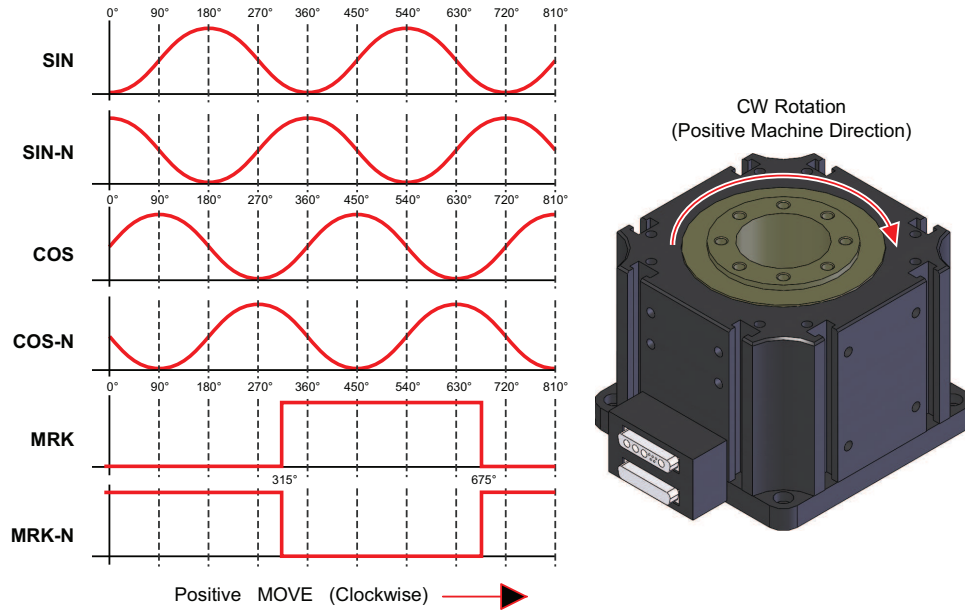
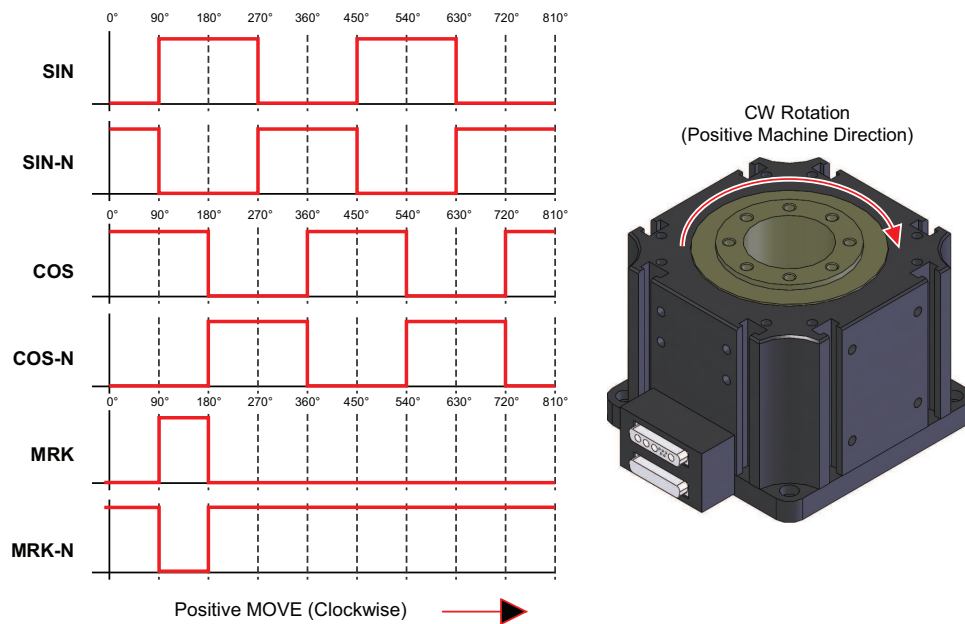


Figure 3-3: Hall Phasing



**Figure 3-4: Analog Encoder Phasing Reference Diagram**



**Figure 3-5: Encoder Phasing Reference Diagram (Standard)**



## Chapter 4: Maintenance

The ADRT series stages are designed to require minimum maintenance.

### 4.1. Service and Inspection Schedule



**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.

Inspect the ADRT at least once per month. A longer or shorter inspection interval may be required depending on the specific application, and conditions such as the duty cycle, speed, and environment.

Monthly inspections should include but not be limited to:

- Visually inspect the stage and cables.
- Re-tighten loose connectors.
- Replace or repair damaged cables.
- Clean the ADRT and any components and cables as needed.
- Repair any damage before operating the ADRT.
- Inspect and perform an operational check on all safeguards and protective devices.

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.

### 4.2. Cleaning and Lubrication

There are no elements on ADRT stages that require lubrication.

The bearings, motors, and encoders for the ADRT series require no added lubrication or maintenance. Periodic cleaning is recommended.

Before using a cleaning solvent on any part of the ADRT, 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.

## 4.5. Troubleshooting

Symptom	Possible Cause and Solution
Stage will not move	<ul style="list-style-type: none"><li>• Brake not released (if equipped with brake; refer to stage documentation).</li><li>• In Limit condition. Check limits (refer to <a href="#">Chapter 3</a>) and refer to the Controller documentation for polarity and compatibility requirements (Example: voltage requirements).</li><li>• Controller trap or fault (refer to the Controller documentation).</li></ul>
Stage moves uncontrollably	<ul style="list-style-type: none"><li>• Encoder (sine and cosine) signal connections (refer to <a href="#">Chapter 3</a> and Controller documentation).</li><li>• Motor Connections (refer to <a href="#">Chapter 3</a> and the Controller documentation).</li></ul>
Stage oscillates or squeals	<ul style="list-style-type: none"><li>• Gains misadjusted (refer to the Controller documentation).</li><li>• Encoder signals (refer to the Controller documentation).</li></ul>

## 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>

<b>USA, CANADA, MEXICO</b> Aerotech, Inc. Global Headquarters Phone: +1-412-967-6440 Fax: +1-412-967-6870	<b>CHINA</b> Aerotech China Full-Service Subsidiary Phone: +86 (21) 5508 6731	<b>GERMANY</b> Aerotech Germany Full-Service Subsidiary Phone: +49 (0)911 967 9370 Fax: +49 (0)911 967 93720
<b>JAPAN</b> Aerotech Japan Full-Service Subsidiary Phone: +81 (0)50 5830 6814 Fax: +81 (0)43 306 3773	<b>TAIWAN</b> Aerotech Taiwan Full-Service Subsidiary Phone: +886 (0)2 8751 6690	<b>UNITED KINGDOM</b> 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
1.02.00	Full Revision
1.01.00	<ul style="list-style-type: none"><li>• Added Declaration of Incorporation section</li><li>• Added Environmental Specifications section</li><li>• Added Optical Limit Adjustment section</li><li>• Added safety information and warnings</li><li>• Added note about current requirements of motor and ground wires</li><li>• Description of limit switches changed</li><li>• JP6 options changed, and Limit Switch Wiring figure updated:</li><li>• Pin 8 is now Reserved</li></ul>
1.00.00	New manual

*This page intentionally left blank.*

# Index

	<b>2</b>		<b>H</b>	
2010		9	Hall-Effect Sensors Specifications	40
	<b>A</b>		Humidity	13
Altitude		13	<b>I</b>	
Ambient Temperature		13	Inspection Schedule	49
Attaching the Payload		27	<b>L</b>	
	<b>B</b>		label	17
Brake Specifications		40	Lifting Instructions	17
	<b>C</b>		Limit Switch Specifications	40
cleaning			lubrication	49
solvents		49	Lubrication	49
Cleaning		49	<b>M</b>	
Cleaning Solvents			mounting surface	
Recommended		49	securing stage	25
	<b>D</b>		<b>P</b>	
Dimensions		18	part number	17
	<b>E</b>		Performance Specifications	
Electrical Installation		35	S-130	43
Electrical Specifications			S-180	44
S-130		43	S-240	45
S-180		44	S-76	42
S-240		45	Protection Rating	13
S-76		42	protective ground connection	36
EN 60204-1		9	<b>R</b>	
EN ISO 12100		9	red, anodized aluminum	17
Encoder Specifications		40	<b>S</b>	
	<b>F</b>		S-130	
field service		49	Electrical Specifications	43
	<b>G</b>		Performance Specifications	43
Global Technical Support		2	S-180	
			Electrical Specifications	44
			Performance Specifications	44

---

S-240	
Electrical Specifications	45
Performance Specifications	45
S-76	
Electrical Specifications	42
Performance Specifications	42
serial number	17
Service	49
shipping clamps	17
Shipping Clamps	17
stabilizing stage	17
stage	
distortion	25
stabilizing	17
Support	2
	<b>T</b>
Technical Support	2
Thermistor Specifications	40
	<b>V</b>
Vibration	13
	<b>W</b>
Warranty and Field Service	51