

# ABRT Series

## Air-Bearing Rotary Stage

High torque output, direct-drive slotless, brushless servomotor

Zero cogging motor for outstanding velocity stability

Outstanding error motion and wobble performance

Direct coupled, high-accuracy rotary encoder

Large diameter clear aperture

No mechanical contact



Aerotech's ABRT series rotary air-bearing stages provide superior angular positioning, velocity stability, and error motion performance along with impressive payload capacity and outstanding radial and axial stiffness. The ABRT is designed to meet the exacting requirements of DVD mastering, wafer inspection, high precision metrology applications, X-ray diffraction systems, optical inspection and fabrication, and MEMS/nanotechnology device fabrication.

### Superior Mechanical Design

The ABRT design features large air-bearing surfaces and innovative preloading for high stiffness and load capacity, producing not only excellent axial and radial error motions, but outstanding tilt error motion, as well. The resultant performance is significantly better than other rotary air-bearing tables and spindles, greatly benefiting applications requiring exceptional planar performance. Furthermore, this stage family provides a clear aperture that can be used for product feed-through, laser beam delivery, cable clearance, or application-specific requirements.

### Brushless Direct-Drive

To maximize positioning performance, the ABRT series utilizes optimized versions of Aerotech's S-series slotless, brushless motor. The motor uses an advanced magnetic

circuit design to produce high torque output with minimal heat generation. The slotless design is inherently zero-cogging and torque-ripple-free. This makes ABRT stages ideal for applications requiring smooth scan velocities at low or high speeds.

### Accurate Positioning

An optical encoder is standard with the ABRT. When coupled with Aerotech's feedback multipliers and controls, resolutions of <0.03 arc second are achievable.

### Custom Designs

Custom versions of the ABRT are available to satisfy rate table and high precision inertial guidance test-stand applications. Other features, such as slip rings and rotary unions, are available.

### Flexible Configurations

Aerotech manufactures a wide range of servo amplifiers and advanced controllers to provide a complete, integrated package.

## ABRT Series SPECIFICATIONS

ABRT Series		ABRT-150	ABRT-200	ABRT-260
Width		146 mm	196 mm	260 mm
Tabletop Diameter		100 mm	145 mm	200 mm
Height		135 mm	165 mm	185 mm
Aperture		20 mm	30 mm	50 mm
Total Travel		360° Continuous		
Motor		Direct-Drive Brushless Servomotor		
Stall Torque, Continuous		0.36 N-m	3.7 N-m	6.7 N-m
Peak Torque		1.4 N-m	14.6 N-m	26.6 N-m
BEMF, Line-Line, Max		10.9 V <sub>pk</sub> /krpm	163.6 V <sub>pk</sub> /krpm	129.8 V <sub>pk</sub> /krpm
Continuous Current, Stall		3.8 A <sub>pk</sub>	2.7 A <sub>pk</sub>	6.2 A <sub>pk</sub>
		2.7 A <sub>rms</sub>	1.9 A <sub>rms</sub>	4.4 A <sub>rms</sub>
Torque Constant		0.09 N-m/A <sub>pk</sub>	1.35 N-m/A <sub>pk</sub>	1.07 N-m/A <sub>pk</sub>
		0.13 N-m/A <sub>rms</sub>	1.91 N-m/A <sub>rms</sub>	1.52 N-m/A <sub>rms</sub>
Bus Voltage		Up to 320 VDC		
Resolution <sup>(1)</sup>		0.267 μrad (0.055 arc sec)	0.174 μrad (0.036 arc sec)	0.133 μrad (0.027 arc sec)
Fundamental Encoder Resolution		11,840 lines/rev	18,000 lines/rev	23,600 lines/rev
Max Speed		1200 rpm	800 rpm	600 rpm
Accuracy	Calibrated	±2 arc sec		
Repeatability		<1 arc sec		
Max Load <sup>(3)</sup>	Axial	20 kg	40 kg	70 kg
	Radial	4 kg	10 kg	18 kg
	Tilt	3.5 N-m	10 N-m	20 N-m
Axial Error Motion (Synchronous)		<100 nm		
Radial Error Motion (Synchronous)		<150 nm		
Tilt Error Motion (Synchronous)		<2.4 μrad (<0.5 arc-sec)		
Axial Error Motion (Asynchronous)		<20 nm		
Radial Error Motion (Asynchronous)		<20 nm		
Tilt Error Motion (Asynchronous)		<0.2 μrad (<0.04 arc-sec)		
Operating Pressure <sup>(5)</sup>		80 psig (5.5 bar) ± 5 psig (0.3 bar)		
Air Consumption <sup>(6)</sup>		<2 scfm		
Inertia	Unloaded	2700 kg-mm <sup>2</sup>	13,500 kg-mm <sup>2</sup>	46,400 kg-mm <sup>2</sup>
Total Mass		6.7 kg	14.7 kg	27.1 kg
Material		Aluminum		
Finish		Hardcoat (62 Rockwell Hardness)		

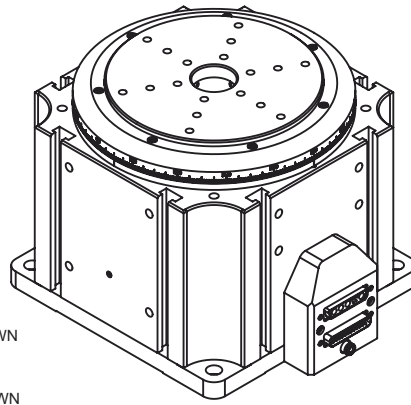
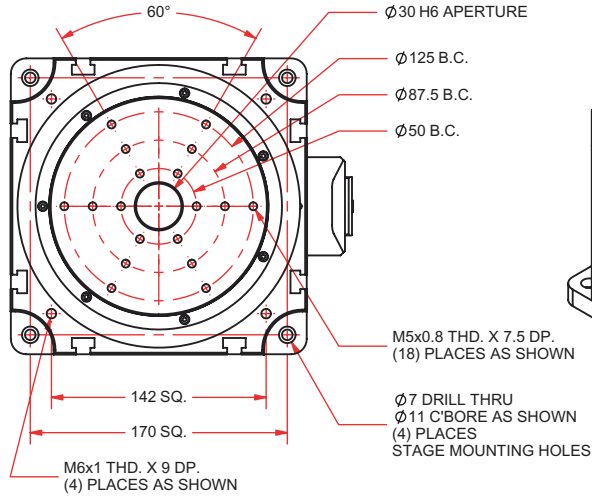
Notes:

1. Maximum resolution presumes A3200 controller using MXH500 multiplication, and accounts for controller quadrature.
2. Maximum speed based on stage capability. Maximum application velocity may be limited by system data rate and system resolution.
3. Maximum loads are mutually exclusive.
4. All error motion specifications measured at 60 rpm.
5. To protect air bearing against under-pressure, an in-line pressure switch tied to the motion controller is recommended.
6. Air supply must be clean, dry to 0° F dew point, and filtered to 0.25 μm or better. Recommend nitrogen at 99.9% purity.

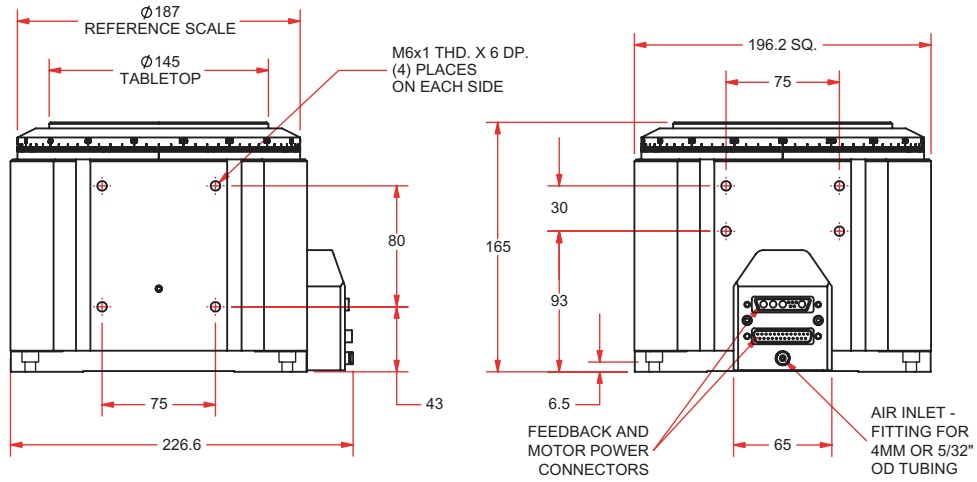


# ABRT Series DIMENSIONS

## ABRT-200

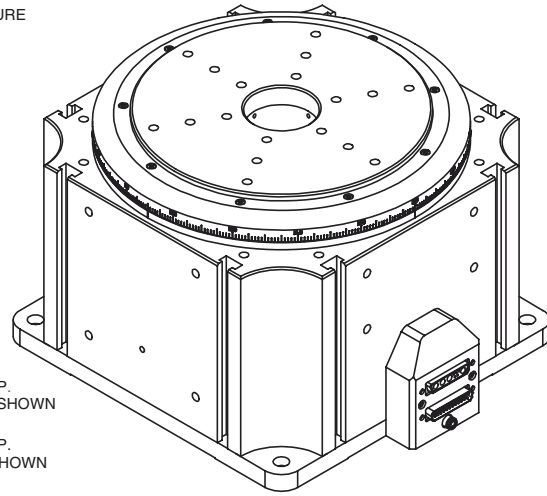
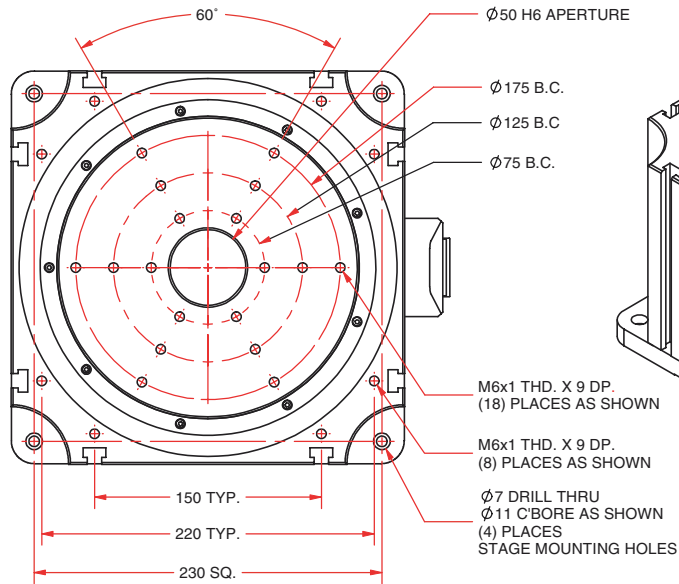


DIMENSIONS - MILLIMETERS

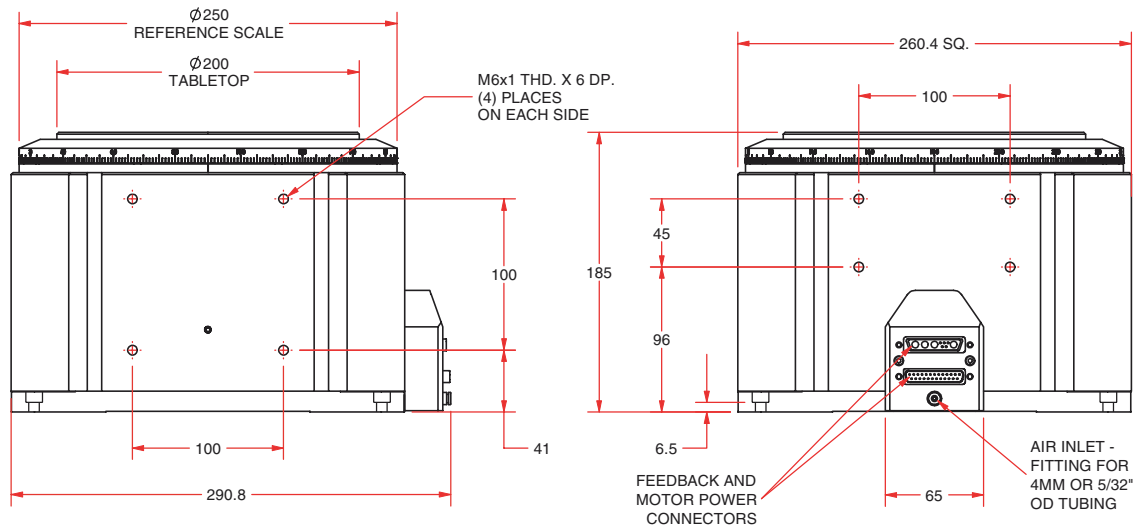


## ABRT Series DIMENSIONS

### ABRT-260



**DIMENSIONS - MILLIMETERS**



## ABRT Series ORDERING INFORMATION

### Ordering Example

ABRT	-200	-AS
Series	Width (mm)	Position Transducer
	-150	-AS
	-200	-X50
	-260	

### ABRT Series Direct-Drive, Air-Bearing, Rotary Stage

ABRT-150	150 mm wide air-bearing rotary stage with 1.5 N-m continuous torque output
ABRT-200	200 mm wide air-bearing rotary stage with 3.7 N-m continuous torque output
ABRT-260	260 mm wide air-bearing rotary stage with 6.7 N-m continuous torque output

### Position Transducer

-AS	Standard feedback device, sine wave output; 11,840 cycles per rev on ABRT-150; 18,000 cycles per rev on ABRT-200; and 23,600 cycles per rev on ABRT-260
-X50	Square-wave digital output; 592,000 cycles per rev on ABRT-150; 900,000 cycles per rev on ABRT-200; and 1,180,000 cycles per rev on ABRT-260

Note: Digital output encoder signals are synthesized with a 40 MHz clock. Care must be taken to ensure that the encoder sample rate on the controller is 40 MHz or higher. Slower clock rates are available upon request.