

AXR Series

Two-Axis Rotary Assembly

Multiple configurations support a range of load and accuracy requirements

Integral rotary union for vacuum- or air-activated tooling

High-speed yaw axis provides up to 1000 rpm

High-load gear-drive or high-speed, direct-drive tilt-axis configurations

Optional sealing protects the system from airborne particulates

Brake available to limit stage motion in the unpowered state

Aerotech's AXR integrated two-axis rotary assembly provides high-speed machining capabilities for complex 3D part geometries. The precision-aligned system allows accurate positioning on a hemispherical surface. Multiple frame sizes with direct- or gear-driven options provide a wide range of load carrying capability.

Direct-Drive Yaw Axis

All AXR series rotary combinations feature a direct-drive yaw (B) axis. Direct-drive motors exhibit significantly higher throughput and maintenance-free operation when compared to gear- and screw-driven technology. With peak rotation speeds of up to 1000 rpm, the AXR is capable of supporting high-speed machining processes. A high-resolution encoder enables the axis to run at extremely slow speeds while maintaining excellent velocity regulation and positioning accuracy.

High-Capacity Tilt Axis

The AXR has both direct-drive and gear-driven tilt (A) axis configurations to meet the performance requirements of your specific application. The direct-drive version provides the highest possible operating speed and accuracy for demanding applications. A modular counterbalance system and different yaw mounting heights are available to balance offset loads. The tilt axis can be equipped with a brake to hold axis position when power is removed. For large load



AXR two-axis rotary assembly provides high-speed machining for complex 3D geometries.

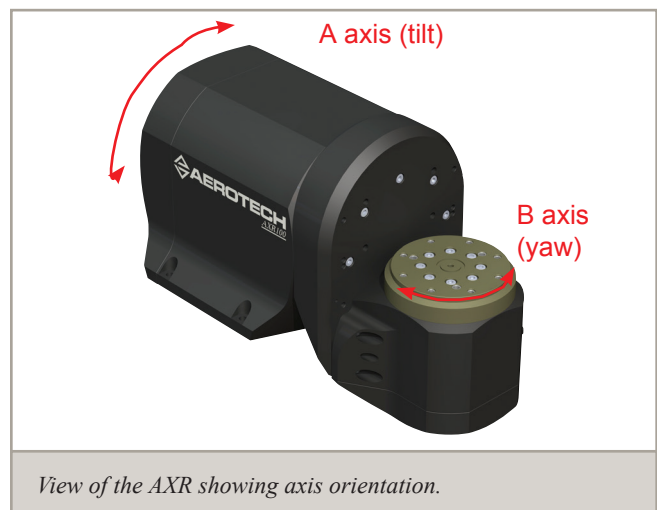
applications, the gear-drive units provide significantly higher continuous torque output while the drive mechanism limits motion in the power-off state. The precision anti-backlash gearing enables this higher torque output while still maintaining excellent accuracy and repeatability performance.

Material Handling

The AXR comes standard with an integral rotary union that provides a single pneumatic control signal to the yaw-axis tabletop for customer supplied air- or vacuum-actuated tooling. The AXR can also be outfitted with a 3-jaw manual chuck for maximum part-holding flexibility.

Scalable Product Solutions

With both direct-drive and gear-driven platforms, various yaw table locations, a scalable counterbalance, standard pneumatic feed-through and an optional 3-jaw chuck, the AXR can be configured to meet the requirements of most two-axis rotary assemblies.



View of the AXR showing axis orientation.

AXR Series SPECIFICATIONS

Basic Model		AXR100		AXR150		
		Tilt (A) Axis Direct Drive	Yaw (B) Axis Direct Drive	Tilt (A) Axis Direct Drive	Tilt (A) Axis Gear Drive	Yaw (B) Axis Direct Drive
Travel		+10° to -100°	Unlimited	+10° to -100°	+10° to -100°	Unlimited
Accuracy ⁽¹⁾	Uncalibrated	±145 µrad (±30 arc sec)		±145 µrad (±30 arc sec)	±242 µrad (±50 arc sec)	±145 µrad (±30 arc sec)
	Calibrated	±14.5 µrad (±3 arc sec)		±14.5 µrad (±3 arc sec)	±24.2 µrad (±5 arc sec)	±14.5 µrad (±3 arc sec)
Resolution		0.05 arc sec	0.08 arc sec	0.04 arc sec	0.04 arc sec	0.05 arc sec
Repeatability (Bi-Directional) ⁽¹⁾		1 arc sec		1 arc sec	5 arc sec	1 arc sec
Tilt Error Motion		N/A	5 arc sec	N/A	N/A	3 arc sec
Axial Error Motion		N/A	1.5 µm	N/A	N/A	1 µm
Radial Error Motion		N/A	3 µm	N/A	N/A	2 µm
Orthogonality		50 µrad (10 arc sec)		50 µrad (10 arc sec)		
Axis Intersection		±10 µm (0.00039 in)		±10 µm (0.00039 in)		
Gear Ratio		N/A		N/A	51:1 101:1 161:1	N/A
Maximum Speed ⁽⁵⁾		720°/s	1000 rpm	720°/s	60°/s 30°/s 18°/s	600 rpm
Maximum Torque (Continuous)		4.18 N·m	0.48 N·m	11.12 N·m	305 N·m 605 N·m 964 N·m	2.36 N·m
System Load Capacity		15 kg		30 kg		
Rotor Inertia (Unloaded)	No Offset	0.070 kg·m ²	0.00107 kg·m ²	0.216 kg·m ²	0.211 kg·m ²	0.00686 kg·m ²
	Offset			0.178 kg·m ²	0.174 kg·m ²	
	Chuck Option			0.212 kg·m ²	0.207 kg·m ²	
Stage Mass ⁽⁶⁾	No Offset	24 kg	N/A	45.5 kg	44 kg	N/A
	Offset	24.4 kg	N/A	46.8 kg	45.5 kg	N/A
	Chuck Option	24.9 kg	N/A	50.7 kg	49.4 kg	N/A
Material		Aluminum		Aluminum		
MTBF		20,000 Hours		20,000 Hours	15,000 Hours	20,000 Hours

Notes:

1. Certified with each stage.
2. On-axis loading is listed.
3. All error motion specifications are measured at 60 rpm.
4. For high speed operation, customer payload must be balanced to G1.0 per ISO 1940.
5. Max speed is listed for unloaded stages. Max speed of gear-drive unit is a function of gear ratio. Speeds are 10 rpm, 5 rpm, and 3 rpm.
6. Mass listed is the combined mass of both A and B axes.

Electrical Specifications	AXR100		AXR150		
	Tilt (A) Axis Direct Drive	Yaw (B) Axis Direct Drive	Tilt (A) Axis Direct Drive	Tilt (A) Axis Gear Drive	Yaw (B) Axis Direct Drive
Drive System	Slotless, brushless direct-drive torque motor		Slotless, brushless direct-drive torque motor	Slotless, brushless torque motor with harmonic gear drive	Slotless, brushless direct-drive torque motor
Feedback	Noncontact rotary encoder (see counts per revolution options on Order Information page)		Noncontact rotary encoder (see counts per revolution options on Order Information page)		
Maximum Bus Voltage	340 VDC		340 VDC		
Limit Switches	5 V, Normally Open	N/A	5 V, Normally Open	5 V, Normally Open	N/A
Home Switch	At Limit	N/A	At Limit	At Limit	N/A

Recommended Controller		
Multi-Axis	A3200	Ndrive MP10/Ndrive CP10/Npaq
	Ensemble	Ensemble MP10/Ensemble CP10/Epaq
Single Axis	Soloist	Soloist MP10/Soloist CP10

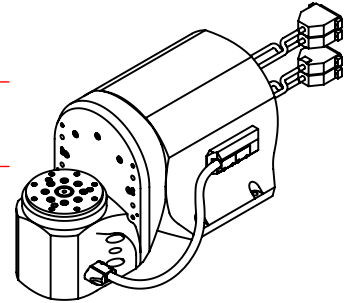
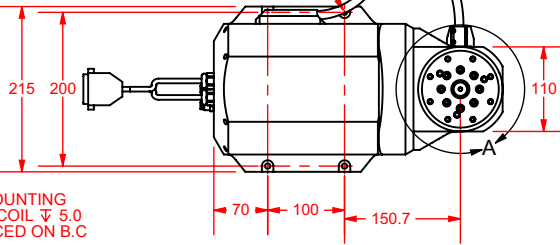
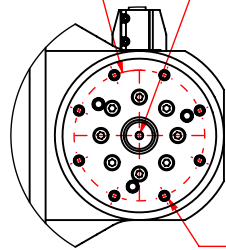
AXR Series DIMENSIONS

AXR100D

Ø85 B.C.

CUSTOMER PNEUMATIC SUPPLY
M5-0.8 THREAD
(NOT AVAILABLE ON -100C)

4X \square Ø15 SLOTTED
Ø7 THRU
STAGE MOUNTING HOLES



CUSTOMER MOUNTING
8X M5-0.8 HELICOIL ∇ 5.0
EQUALLY SPACED ON B.C.

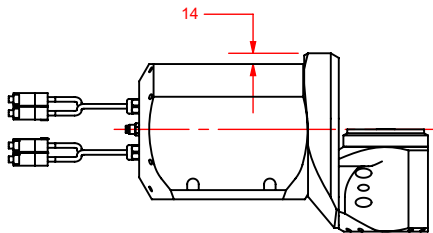
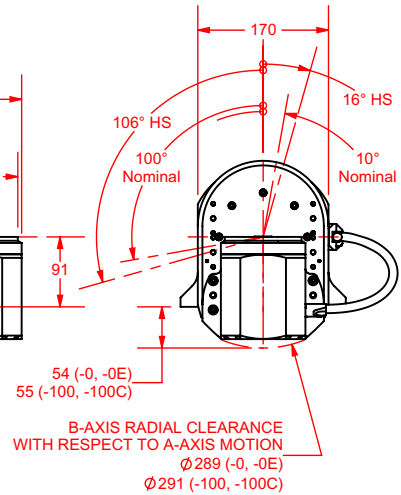
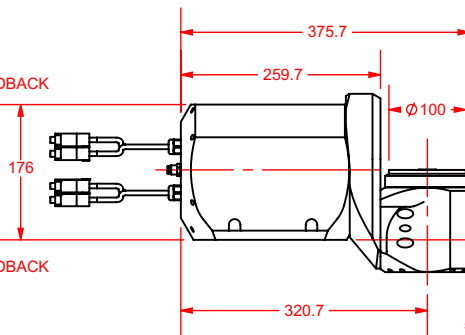
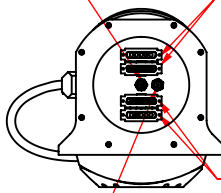
DETAIL A
SCALE 1:5

CUSTOMER PNEUMATIC SUPPLY
TO TABLET, 4MM OD FITTING
(NOT AVAILABLE ON -100C)

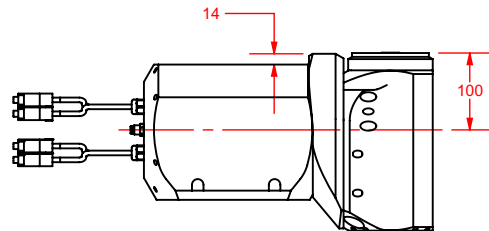
MOTOR/FEEDBACK
A-AXIS

MOTOR/FEEDBACK
B-AXIS

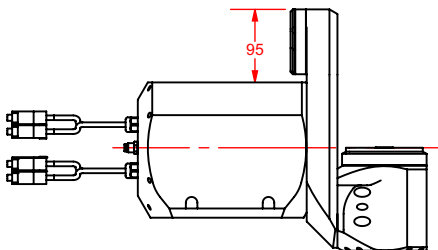
BRAKE SUPPLY PRESSURE,
4MM OD FITTING
(-B OPTION ONLY)



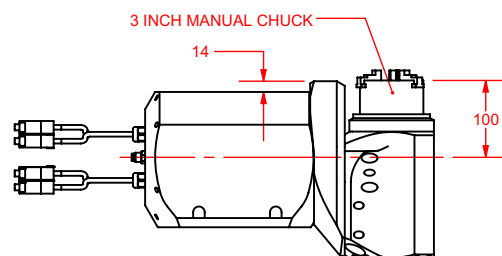
(-0) B-AXIS TABLET ON
A-AXIS CENTER OF ROTATION



(-100) B-AXIS TABLET 100MM FROM
A-AXIS CENTER OF ROTATION



(-0E) B-AXIS TABLET ON
A-AXIS CENTER OF ROTATION, WITH
EXTENDED YOKE COUNTERBALANCE

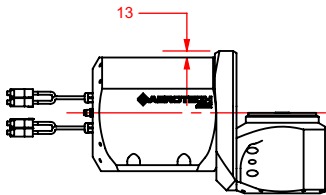
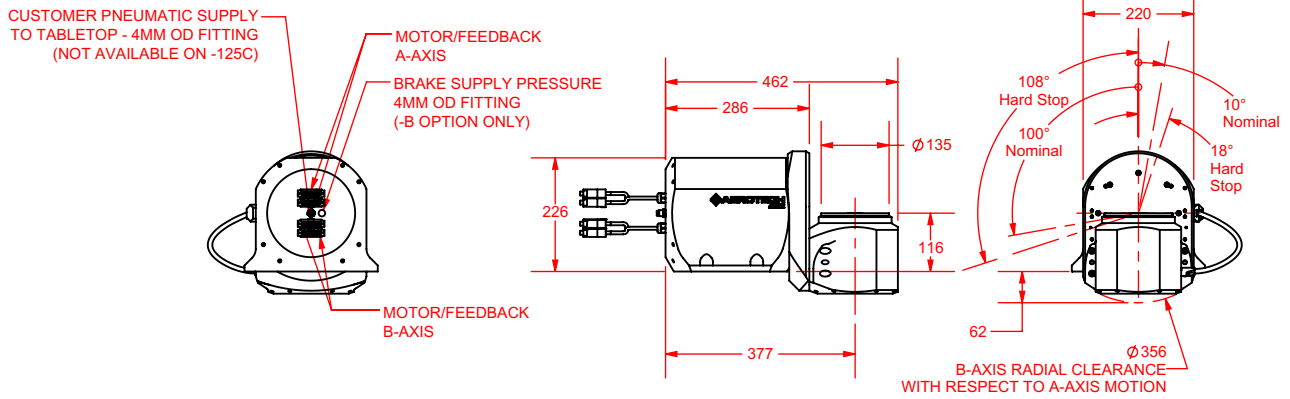
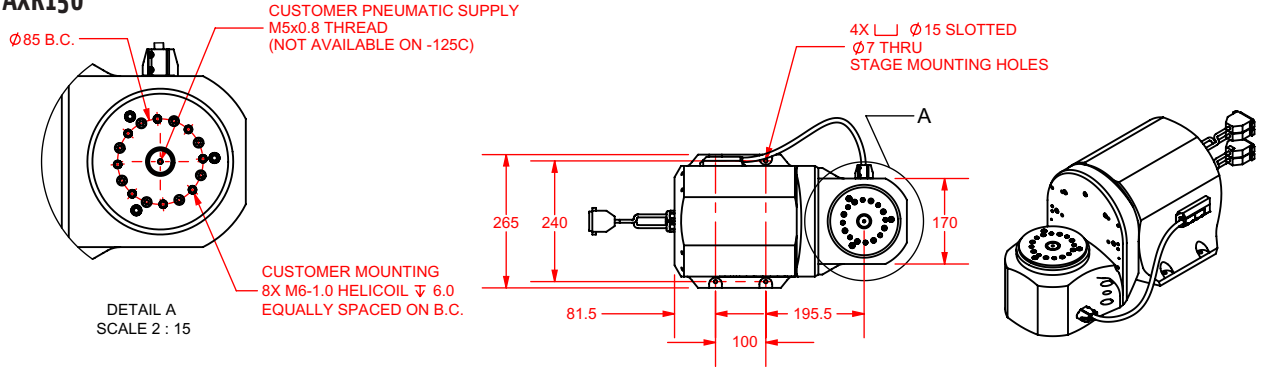


(-100C) TABLET OF CHUCK 100MM FROM
A-AXIS CENTER OF ROTATION

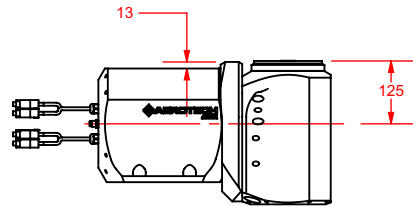
DIMENSIONS: MILLIMETERS

AXR Series DIMENSIONS

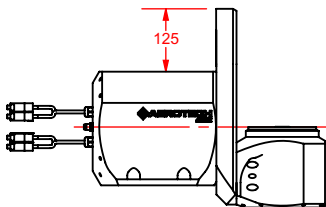
AXR150



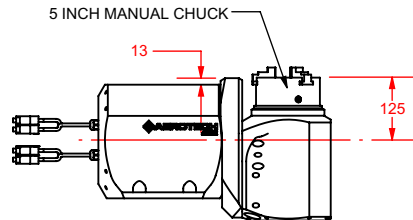
(-0) B-AXIS TABLETOP ON A-AXIS CENTER OF ROTATION



(-125) B-AXIS TABLETOP MEASURED FROM CENTERLINE OF A-AXIS



(-0E) B-AXIS TABLETOP ON A-AXIS CENTER OF ROTATION, WITH EXTENDED YOKE COUNTERBALANCE



(-125C) TABLETOP OF CHUCK MEASURED FROM CENTERLINE OF A-AXIS

DIMENSIONS: MILLIMETERS

AXR Series ORDERING INFORMATION

AXR Series (Required)

AXR	Two-axis tilt/yaw rotary assembly
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Axis Configuration (Required)

100D	Direct-drive tilt (A) axis and yaw (B) axis rated for 15 kg maximum load
150D	Direct-drive tilt (A) axis and yaw (B) axis rated for 30 kg maximum load
150G	Gear-drive tilt (A) axis with direct-drive yaw (B) axis; rated for 30 kg maximum load

Yaw Axis Configuration (Required)

-0	Yaw (B) axis tabletop height of AXR100D and AXR150x located at the center of rotation of the tilt (A) axis; no counterweight attachment supported
-0E	Yaw (B) axis tabletop height of AXR100D and AXR150D located at the center of rotation of the tilt (A) axis; includes attachment features for counterweights to balance offset loads
-100	Yaw (B) axis tabletop height for AXR100D is located 100 mm above the center of rotation of the tilt (A) axis; includes attachment features for counterweights to balance offset loads
-100C	Yaw (B) axis with 3-jaw 3.25-inch (82.6 mm) diameter manual scroll chuck; chuck jaws of AXR100D are located 100 mm above the center of rotation of the tilt (A) axis; includes attachment features for counterweights to balance offset loads and 3-jaw manual chuck
-125	Yaw (B) axis tabletop height for AXR150x is located 125 mm above the center of rotation of the tilt (A) axis; includes attachment features for counterweights to balance offset loads
-125C	Yaw (B) axis with 3-jaw 5-inch (127 mm) diameter manual scroll chuck; chuck jaws of AXR150x are located 125 mm above the center of rotation of the tilt (A) axis; includes attachment features for counterweights to balance offset loads and 3-jaw manual chuck

Note: 0E option not available on gear-driven AXRs (150G). Gearbox has sufficient holding torque to balance maximum moment load.

Brake Configuration (Optional)

-B	Holding brake for tilt (A) axis; only available on 100D and 150D configurations
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Sealing Configuration (Optional)

-S	Seals on the tilt (A) and yaw (B) axes to prevent ingress of airborne particulates into the stage; the seal does not protect the AXR system from contact with fluids
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Counterweight Configuration (Optional)

-CW1	Counterweight kit for AXR100 (-100, -100C) for offset loads ranging from: -100: 23.5 Nm to 338 Nm -100c: 48 Nm to 242 Nm
-CW2	Counterweight kit for AXR100 (-100, -100C) for offset loads ranging from: -100: 1.4 Nm to 48 Nm -100c: 6 Nm to 36 Nm
-CW3	Counterweight kit for AXR100 (-100) for offset loads of 41.3 Nm
-CW4	Counterweight kit for AXR100 (-100C) for offset loads of 23.4 Nm
-CW5	Counterweight kit for AXR100 (-0E) for offset loads ranging from 10.8 Nm to 54.2 Nm
-CW6	Counterweight kit for AXR100 (-0E) for offset loads ranging from 31.1 Nm to 124.4 Nm
-CW7	Counterweight kit for AXR100 (-0E) for offset loads of 15.7 Nm
-CW8	Counterweight kit for AXR100 (-0E) for offset loads of 13.1 Nm

Notes:

- Offset loads include both the payload and stage unbalance.
- A linear combination of counterweight kits can be employed to achieve balance. See counterbalance chart to determine if application falls within balance limits.

AXR Series ORDERING INFORMATION

Integration (Required)

Aerotech offers both standard and custom integration services to help you get your system fully operational as quickly as possible. The following standard integration options are available for this system. Please consult Aerotech if you are unsure what level of integration is required, or if you desire custom integration support with your system.

- | | |
|------|---|
| -TAS | Integration - Test as system
Testing, integration, and documentation of a group of components as a complete system that will be used together (ex: drive, controller, and stage). This includes parameter file generation, system tuning, and documentation of the system configuration. |
| -TAC | Integration - Test as components
Testing and integration of individual items as discrete components that ship together. This is typically used for spare parts, replacement parts, or items that will not be used together. These components may or may not be part of a larger system. |