

AMG LP (Low Profile) Series

Motorized Position and Rate Gimbals

Continuous 360° rotation of azimuth and elevation including built-in slip ring

High accuracy angular position and rate capability

Direct-drive brushless servomotors result in zero backlash

Cog-free design for outstanding velocity stability

Accommodate loads up to 200 mm in diameter

Low maintenance and high reliability provide the lowest cost of ownership



Aerotech's new AMG LP (Low Profile) position and rate gimbal mounts provide ultra-precise angular position, rate, and acceleration for development and production testing of a wide range of systems. The AMG LP series is ideal for directing optics, lasers, antennas, and sensors at high speed to precise pointing angles. Typical applications include missile seeker test and calibration, electro-optical sensor and FLIR testing, optical testing of sensors in a vacuum, and angular testing of inertial sensors such as gyros, MEMS, and accelerometers. The AMG LP gimbal design incorporates recent Aerotech rotary stage design improvements to provide high performance at an affordable price. The finest quality motors, bearings, and encoders are integrated into precision-machined housings to ensure peak performance. The AMG position and rate gimbals provide precise angular motion with the high performance customers expect from Aerotech products.

Low Profile

By incorporating our low profile direct-drive rotary stages, the LP series is capable of speeds and accelerations that are significantly higher than other competing products of this size. These gimbals have a lower profile compared to competing products within given torque ranges. This results in a smaller and more effective gimbal for many applications where beam height and chamber volume are of utmost concern. Customers with only limited azimuth travel

requirements can have the slip-ring removed for an even lower overall height. Keeping the optical path lower helps improve overall test accuracy. Based on the ADRS rotary stage, the AMG LP provides a high accuracy, smooth motion solution with low maintenance and high reliability.

Accurate 360° Positioning and Rate Generation

Direct-drive brushless torque motors, with rare-earth magnets and high-accuracy angular transducers, are coupled directly to precision shafts for accurate and smooth 360° continuous motion. The absence of gear trains and other drive mechanisms eliminates position error contributions due to mechanical hysteresis and backlash. Directly-coupled high-resolution position transducers ensure highly accurate and repeatable positioning.

A wide-range of performance feedback grades is available. Typical line gimbal resolution ranges from 0.87 to 0.32 μ rad with Aerotech controls. Built-in azimuth slip ring provides for continuous rotation with no cable wrap up.

Superior Mechanical Design Features

High-quality, low-profile bearings maximize performance with respect to wobble, moment stiffness, and rotating friction. Travel limits and hardstops, and brakes are available as standard options.

AMG LP Series DESCRIPTION

Mirror and Alternate Payload Accommodation

A variety of mirror cell diameters are available for standard optic applications. We also provide for custom payload attachment solutions for various device interfaces. Each gimbal mirror cell can be modified or replaced with different shaped cells to accommodate sensors or other odd shaped payloads. We understand customer payloads vary and our engineers have a variety of solutions to implement payloads with offset CGs.

Direct-Drive Motors for Outstanding Control

To maximize positioning and velocity performance, AMG LP gimbal mounts utilize Aerotech's high torque S-series brushless, slotless servomotors. These motors have all of the advantages of a brushless direct-drive motor — no brushes to wear, no gear trains to maintain, high

acceleration, and high speeds. Since it is a slotless, ironless design, there is zero cogging, meaning there is absolutely no torque ripple. This results in smoother motion throughout travel and more precise positioning. These motors are available in different winding configurations to work with high- or low-voltage power supplies.

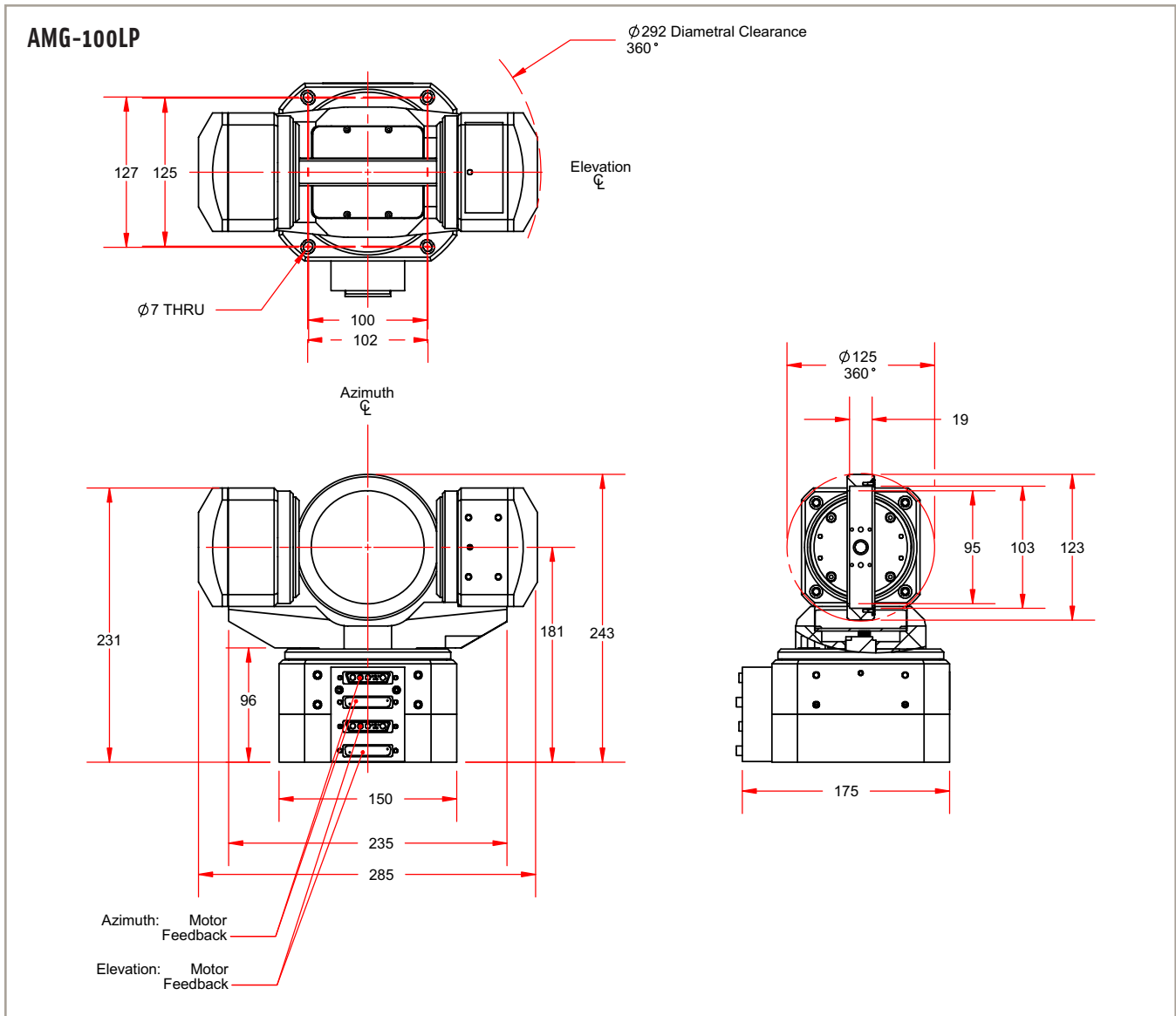
AMG LP Series SPECIFICATIONS

Basic Model	AMG-100LP	AMG-150LP	AMG-200LP
Travel	360° Continuous, AZ/EL		
Clear Aperture Diameter	95 mm	144.3 mm	193.8 mm
Mechanical Drive System	Direct-Drive Brushless Servomotor		
Accuracy ⁽¹⁾	±24 to ±192 µrad (±5 to ±40 arc sec)		
AZ Repeatability	19.4 µrad (4 arc sec)		
EL Repeatability	14.5 µrad (3 arc sec)		19.4 µrad (4 arc sec)
Maximum Rotary Speed ⁽²⁾	100 rpm		
AZ Resolution ⁽³⁾	0.32 µrad (0.06 arc sec)		
EL Resolution ⁽³⁾	0.87 µrad (0.18 arc sec)		0.32 µrad (0.06 arc sec)
Maximum Load Capability	6.8 kg		16 kg
Axis Wobble	97 µrad (20 arc sec)		
Orthogonality	72 µrad (15 arc sec)		
Standard Finish	Black Anodize with Hard-Coated Cell		
Max Component Diameter	103 mm	154 mm	205 mm
Nominal Component Thickness	19 mm	30 mm	40.9 mm
Mass (Without Mirror)	9.5 kg	11 kg	21.5 kg
Inertia AZ ⁽⁴⁾	0.038 kg•m ²	0.071 kg•m ²	0.24 kg•m ²
Inertia EL ⁽⁴⁾	0.001 kg•m ²	0.0038 kg•m ²	0.012 kg•m ²
AZ Motor Type	S-130-39-A		S-180-44-A
EL Motor Type	S-76-35-A		S-130-39-A
AZ Aperture When Slip Ring Is Removed (AZ Travel Must Be Limited)	15 mm	15 mm	25 mm
Aperture With Slip Ring	No Aperture		
Height to Mirror Centerline	181 mm	220 mm	254 mm
Height to Mirror Centerline Without Slip Ring (Limited Travel) ⁽⁵⁾	140.5 mm	179.5 mm	213.5 mm

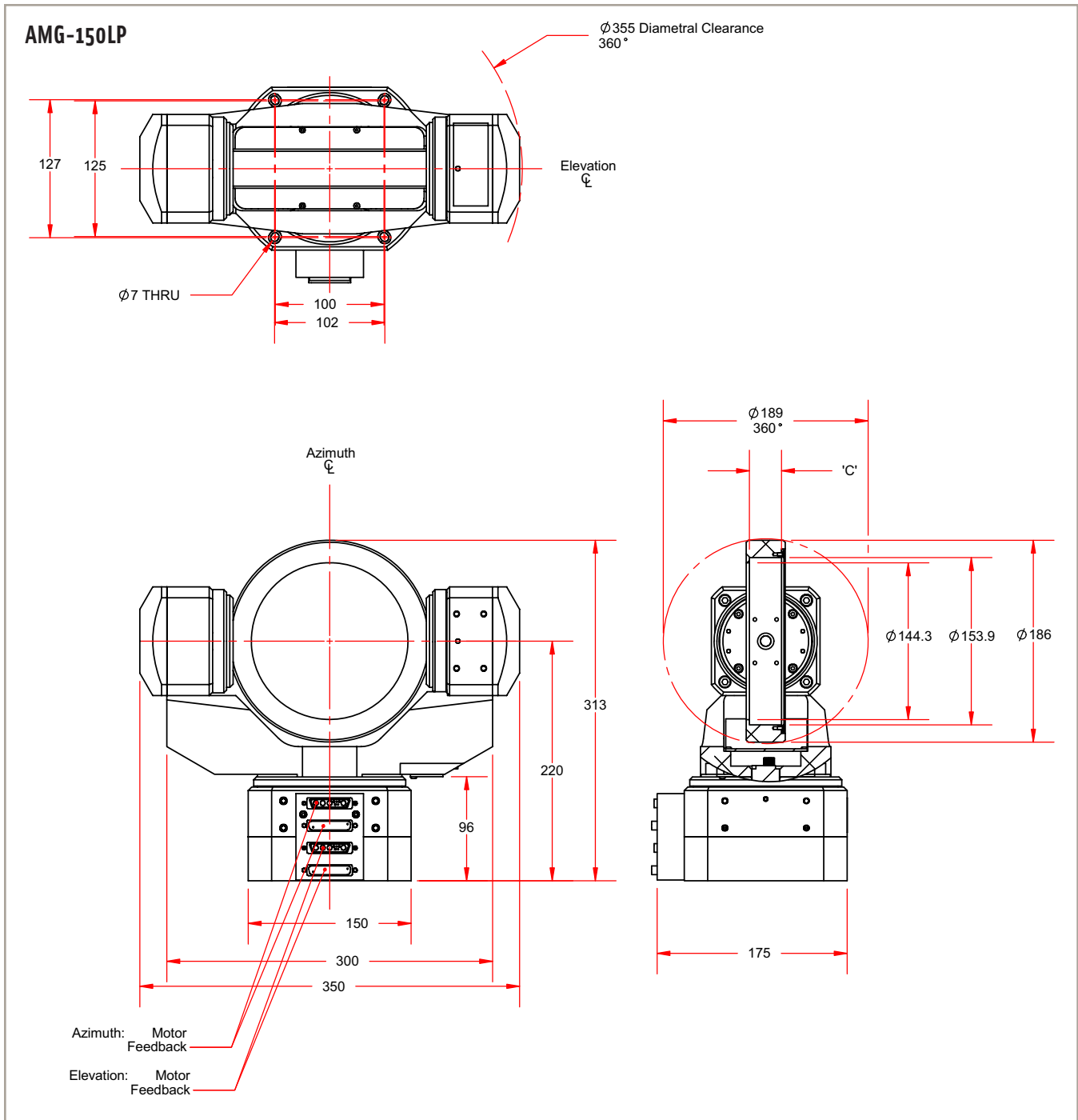
Notes:

- ±24 µrad calibrated (HALAR); ±192 µrad uncalibrated.
- Maximum speed based on stage capability; maximum application velocity may be limited by system data rate and system resolution.
- With 500X multiplication. Higher resolutions available.
- Unloaded inertia.
- Bottom wiring cover is 40.5 mm tall. If customer is using a limited travel system without optical limits then this height can be removed from height with slip ring.

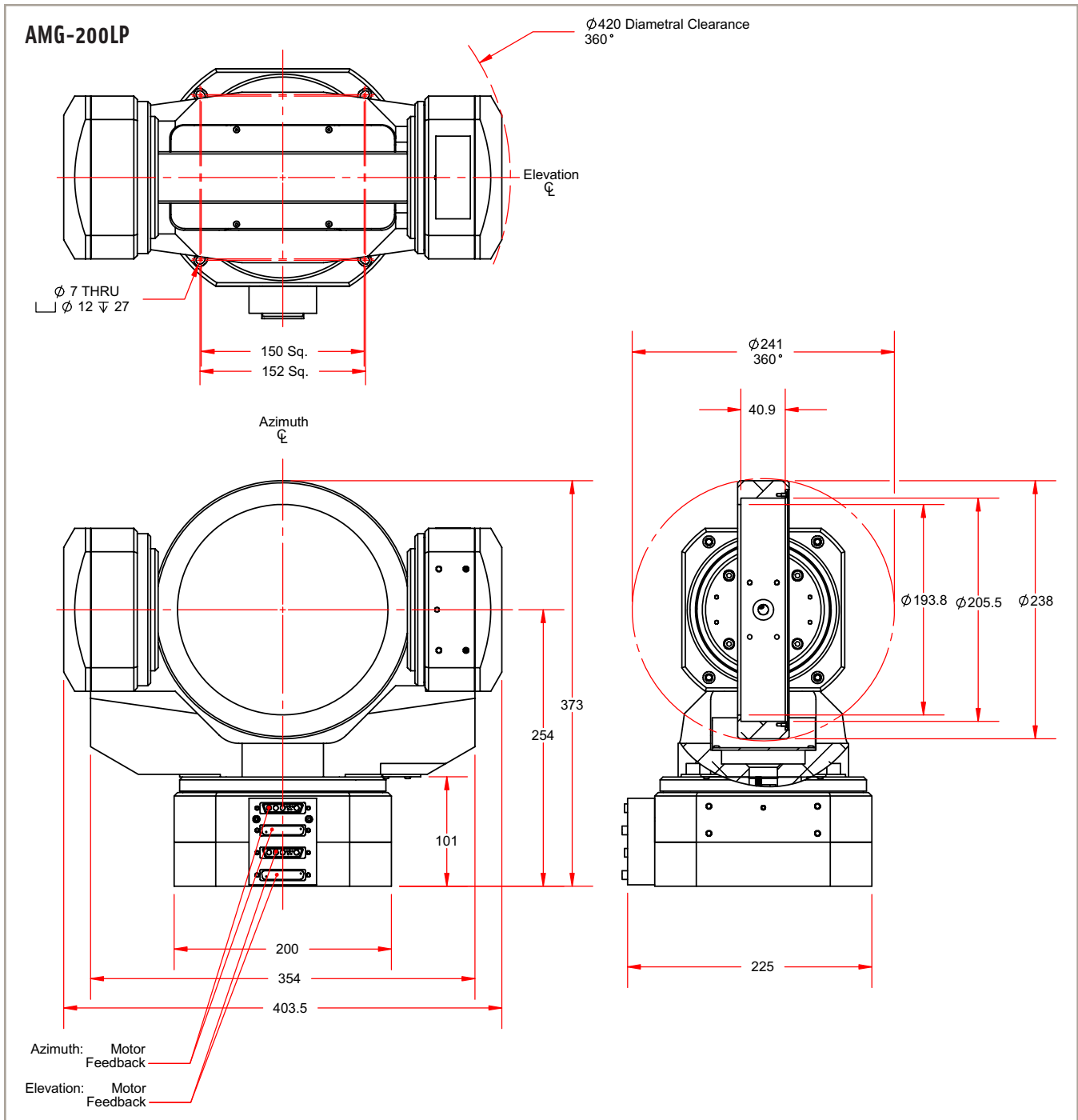
AMG LP Series DIMENSIONS



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AMG LP Series ORDERING INFORMATION

Ordering Example

AMG	-150LP	-AS	(Opt.)/
Model	Cell Size	Position Transducer	Stage & Assembly Options
AMG	-100LP -150LP -200LP	-AS -X5 -X10 -X25 -X50	/VAC3 /VAC6

AMG LP Direct-Drive Motorized Gimbal

AMG-100LP	103 mm cell ID; mirror CG is at the center of rotation; mirror face offset forward of the rotation intersection of AZ/EL 8.5 mm; AZ 10000 line encoder, EL 3600 line encoder; one 25-pin D feedback and one high-power D motor cable required for AZ; one combined motor power and feedback cable is required for EL
AMG-150LP	154 mm cell ID; mirror CG is at the center of rotation; mirror face offset forward of the rotation intersection of AZ/EL 12.7 mm; AZ 10000 line encoder, EL 3600 line encoder; one 25-pin D feedback and one high-power D motor cable required for AZ; one combined motor power and feedback cable required for EL
AMG-200LP	205 mm cell ID; mirror CG is at the center of rotation; mirror face offset forward of the rotation intersection of AZ/EL 16.9 mm; AZ/EL 10000 line encoder; two 25-pin D feedback and two high-power D motor cables required

Position Transducer

AMG-100LP/150LP	
-AS	Standard feedback device, 1 Vpp sine wave output; 10,000 cycles per rev on AZ, 3600 cycles per rev on EL (with 2000x multiplication, post-quad, AZ 0.32 μ rad, EL 0.87 μ rad)
-X5	TTL output encoder with AZ 125.6 μ rad resolution, EL 349.1 μ rad; requires a controller with a minimum 16 MHz encoder sample rate
-X10	TTL output encoder with AZ 63 μ rad resolution, EL 174.5 μ rad; requires a controller with a minimum 16 MHz encoder sample rate
-X25	TTL output encoder with AZ 25.2 μ rad resolution, EL 69.8 μ rad; requires a controller with a minimum 16 MHz encoder sample rate
-X50	TTL output encoder with AZ 12.6 μ rad resolution, EL 34.9 μ rad; requires a controller with a minimum 16 MHz encoder sample rate
AMG-200LP	
-AS	Standard feedback device, 1 Vpp sine wave output; 10,000 cycles per rev on AZ and EL (with 2000x multiplication, post-quad, AZ/EL 0.32 μ rad)
-X5	TTL output encoder with AZ and EL 125.6 μ rad resolution; requires a controller with a minimum 16 MHz encoder sample rate
-X10	TTL output encoder with AZ and EL 63 μ rad resolution; requires a controller with a minimum 16 MHz encoder sample rate
-X25	TTL output encoder with AZ and EL 25.2 μ rad resolution; requires a controller with a minimum 16 MHz encoder sample rate
-X50	TTL output encoder with AZ and EL 12.6 μ rad resolution; requires a controller with a minimum 16 MHz encoder sample rate

Stage Construction Options

/VAC3	Vacuum preparation of stage to 10^{-3} torr
/VAC6	Vacuum preparation of stage to 10^{-6} torr

AMG-100LP Accessories

AOM4T3	3-inch mirror cell adapter
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