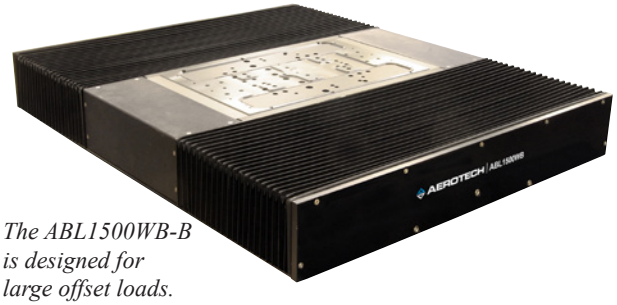
ABL1500WB-B Series

Air Bearing, Linear Motor Stage

- Integral bellows protect the drive and bearing system from contamination
- Wide base for large offset loads
- Powerful dual linear motor drive
- Designed for high-performance scanning and inspection
- Air-on-air preload on all air-bearing surfaces
- Linear encoder feedback provides nanometer-level resolution
- High stiffness for heavy loads and excellent geometrical performance
- Four models with travels from 200 mm to 500 mm



The ABL1500WB-B is designed for large offset loads.

The ABL1500WB-B is a wide-base, environmentally protected version of the ABL1500 series air-bearing stage. The wider base makes the ABL1500WB-B ideally suited for applications with large offset loads, and it is ideal as the lower axis in XY stage systems with large travel. The ABL1500WB-B incorporates dual linear motors, effectively doubling the force output of a standard ABL1500 stage.

Leading-edge industries demand positioning tolerances beyond the capability of conventional ball-screw and mechanical-bearing positioning systems. The ABL1500WB-B, with its integral bellows, exceptionally high stiffness, and excellent geometric characteristics was designed specifically to meet those demands.

Air-Bearing Design for High Dynamic Performance

The ABL1500WB-B incorporates an air-on-air preload on both the vertical and horizontal surfaces. The opposing thin-film pressure maintains the bearing nominal gap tolerance. This design, in addition to the large air-bearing surface that distributes the load over a large surface area, results in a stage with outstanding stiffness that is ideal for heavy or offset loading.

Aerotech's proprietary manufacturing techniques result in a stage with unsurpassed geometrical characteristics, which maximize performance by yielding superior pitch, roll, yaw, straightness, and flatness specifications.

Linear Motor Drive

The driving force behind this stage is Aerotech's BLMC series brushless linear servomotor. The BLMC utilizes an ironless forcer, which means there is zero cogging and no attractive forces, resulting in unsurpassed smoothness of motion.

Zero Maintenance

Our totally noncontact air bearing, noncontact linear motor drive, and noncontact feedback device ensure years of maintenance-free operation at the high performance levels expected of Aerotech equipment. Because there is no mechanical contact between moving elements, the ABL1500WB-B experiences no wear or reduction in performance over time. Service life is virtually unlimited and because there is no lubrication – only clean, dry gas – air bearings are ideal for cleanroom and medical applications.

Cable Management System (CMS)

We carefully optimize the cable bend radius to ensure years of trouble-free operation. In the unlikely event of failure, Aerotech's modular design makes cable replacement quick and easy with minimal downtime.

We include all customer-required cables, air hoses, etc. in our CMS bundle to facilitate integration into the final system. Both ends are fully connectorized for simple integration into the customer's machine.

Integral Bellows

The ABL1500WB-B uses an integral bellows system to provide a high level of environmental protection. This system protects the air bearings and drive system from process-generated contamination like abrasive debris. The design also has been optimized to minimize the influence of the bellows on the stage's geometric performance.

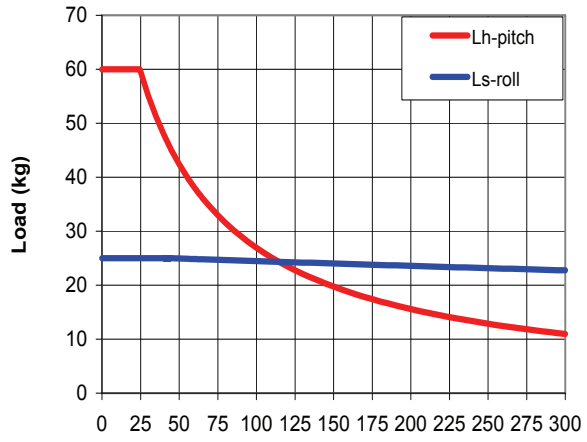
ABL1500WB-B Series SPECIFICATIONS

Mechanical Specifications			ABL1500WB-B-200	ABL1500WB-B-300	ABL1500WB-B-400	ABL1500WB-B-500
Travel			200 mm (8 in)	300 mm (12 in)	400 mm (16 in)	500 mm (20 in)
Accuracy (1)	E1	Calibrated	±0.7 µm (±28 µin)	±0.7 µm (±28 µin)	±0.8 µm (±32 µin)	±0.8 µm (±32 µin)
		Standard	±8.0 µm (±320 µin)	±12.0 µm (±480 µin)	±16.0 µm (±640 µin)	±20.0 µm (±800 µin)
	E3	Calibrated	±0.5 µm (±20 µin)	±0.6 µm (±24 µin)	±0.75 µm (±30 µin)	±0.75 µm (±30 µin)
		Standard	±5.0 µm (±200 µin)	±5.0 µm (±200 µin)	±5.0 µm (±200 µin)	±5.0 µm (±200 µin)
Repeatability (Bi-Directional) (1)	E1		±0.25 µm (±10 µin)	±0.25 µm (±10 µin)	±0.3 µm (±12 µin)	±0.3 µm (±12 µin)
	E3		±0.25 µm (±10 µin)	±0.25 µm (±10 µin)	±0.3 µm (±12 µin)	±0.3 µm (±12 µin)
Straightness (1)			±0.5 µm (±20 µin)	±0.75 µm (±30 µin)	±1.5 µm (±60 µin)	±2.0 µm (±80 µin)
Flatness (1)			±0.5 µm (±20 µin)	±0.75 µm (±30 µin)	±1.5 µm (±60 µin)	±2.0 µm (±80 µin)
Pitch			±2 arc sec	±3 arc sec	±4 arc sec	±5 arc sec
Roll			±2 arc sec	±3 arc sec	±4 arc sec	±5 arc sec
Yaw			±2 arc sec	±3 arc sec	±4 arc sec	±5 arc sec
Maximum Speed	**E1**		2 m/s (80 in/s)			
	E3		1.2 m/s (47.2 in/s)			
Maximum Acceleration			2 g - 20 m/s^2 - 768 in/s^2 (No Load)			
Maximum Force (Continuous)			187.2 N (42.0 lb)			
Load Capacity (2)	Horizontal		60 kg (132.2 lb)			
	Side		25 kg (55 lb)			
Operating Pressure			80 psi (5.5 bar) ±5 psig (0.3 bar)			
Air Consumption			32-40 slpm @ 551 kPa			
Moving Mass (No Load)			13.7 kg (30.2 lb)			
Stage Mass			50.2 kg (110.7 lb)	56.8 kg (125.2 lb)	64.0 kg (141.1 lb)	70.8 kg (156.1 lb)
Material			Hardcoat Anodized Aluminum			
MTBF (Mean Time Between Failure)			30,000 Hours			

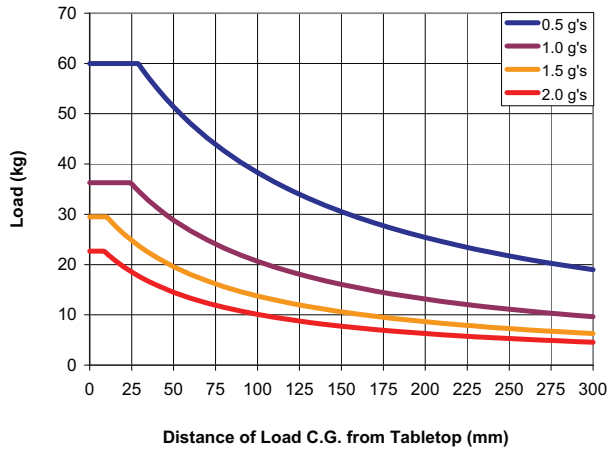
Notes:
1. Certified with each stage.
2. Axis orientation for on-axis loading is listed.
3. Specifications are for single-axis systems measured 25 mm aove the tabletop. Performance of multi-axis systems is payload and workpoint dependent. Consult factory for multi-axis or non-standard applications.
4. To protect air bearing against under-pressure, an in-line pressure switch tied to the motion controller/amplifier E-stop input is recommended.
5. Air supply must be clean, dry to 0° F dewpoint and filtered to 0.25 µm or better; recommend nitrogen at 99.9% purity.
6. For XY configurations utilizing an ABL1500-B as the upper axis and an ABL1500WB-B as the lower axis, the maximum upper axis travel is 300 mm.

Electrical Specifications	
Drive System	Brushless Linear Servomotor
Feedback	Noncontact Linear Encoder (see signal period options on Order Information page)
Maximum Bus Voltage	up to 80 VDC
Limit Switches	5 V, Normally Closed
Home Switch	Near Center

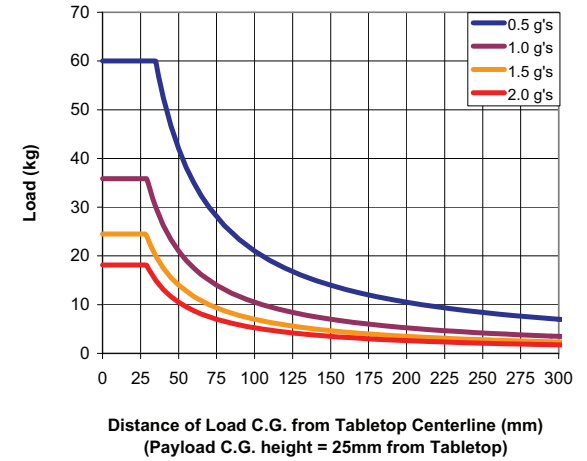
ABL1500WB-B Series SPECIFICATIONS



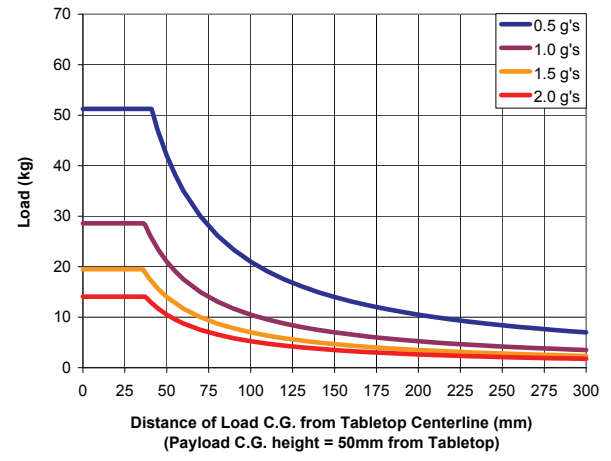
Cantilevered load capability (static conditions) for the ABL1500WB.



Pitch offsets with varying C.O.G. height and laterally centered payload.



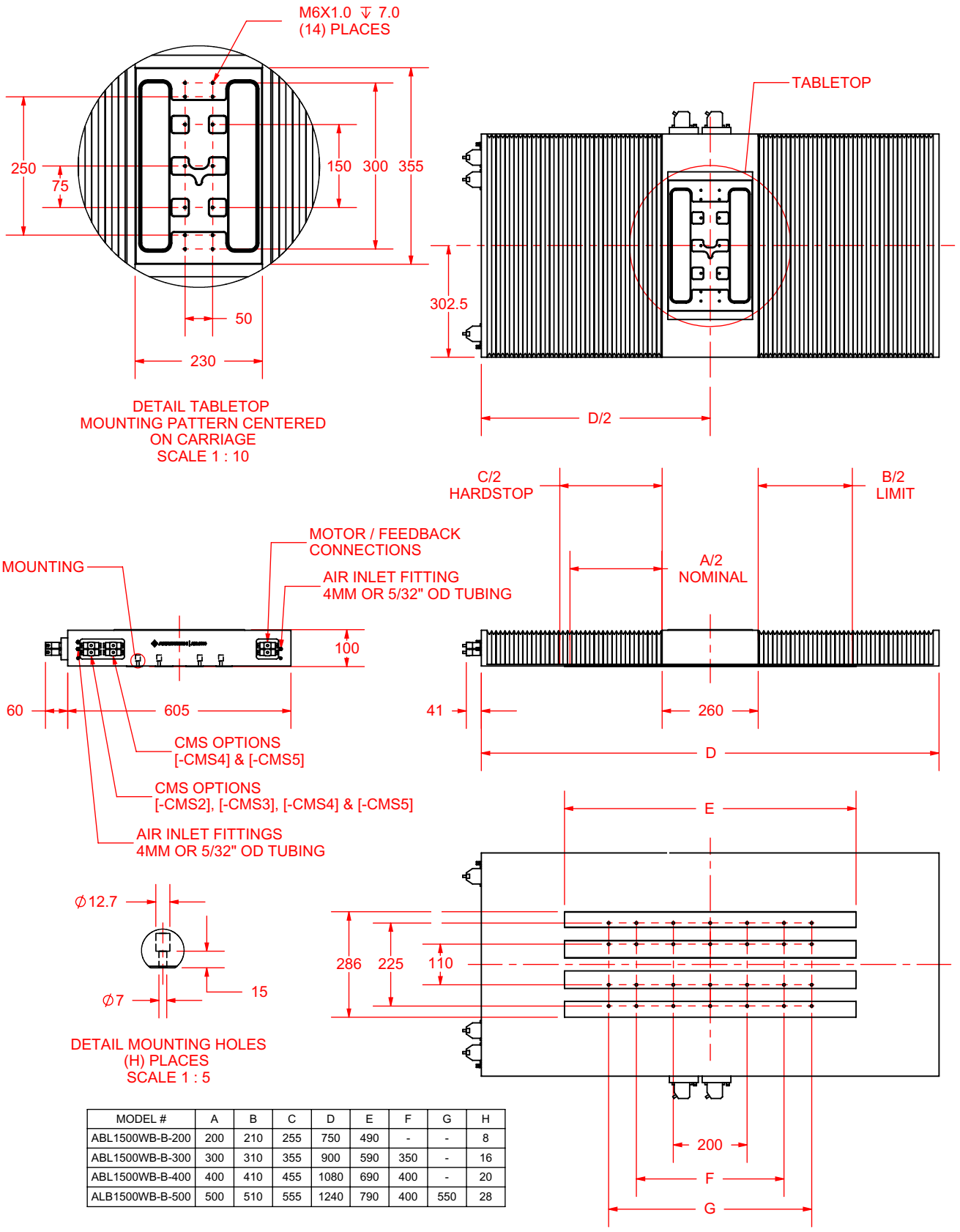
Yaw offsets with payload C.O.G. 25 mm above the tabletop.



Yaw offsets with payload C.O.G. 50 mm above the tabletop.

ABL1500WB-B Series DIMENSIONS

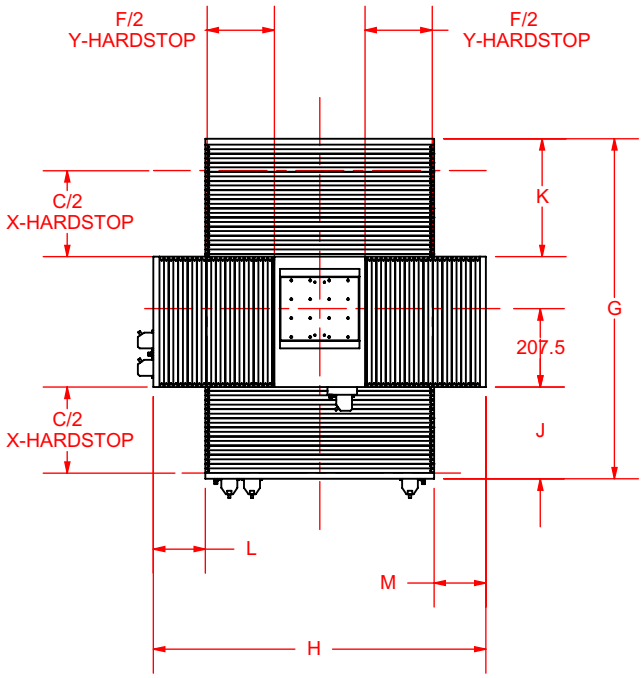
ABL1500WB-B

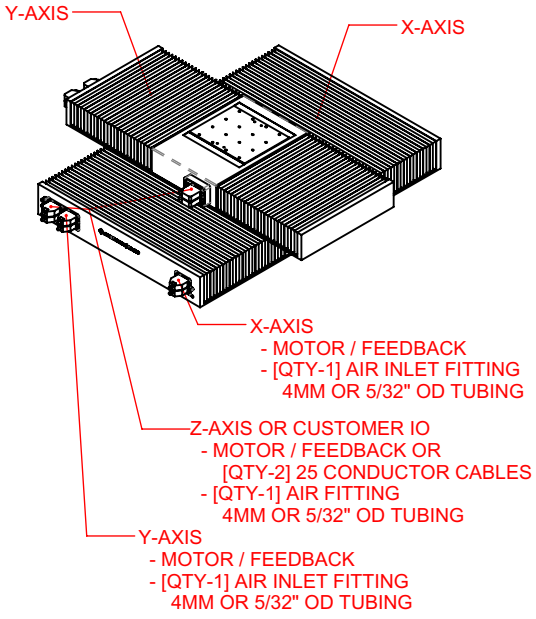


MODEL #	A	B	C	D	E	F	G	H
ABL1500WB-B-200	200	210	255	750	490	-	-	8
ABL1500WB-B-300	300	310	355	900	590	350	-	16
ABL1500WB-B-400	400	410	455	1080	690	400	-	20
ALB1500WB-B-500	500	510	555	1240	790	400	550	28

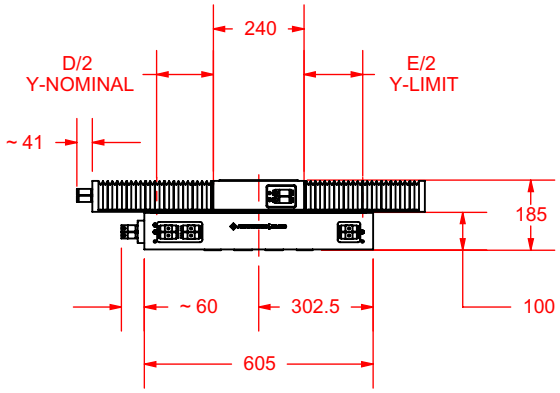
DIMENSIONS: MILLIMETERS

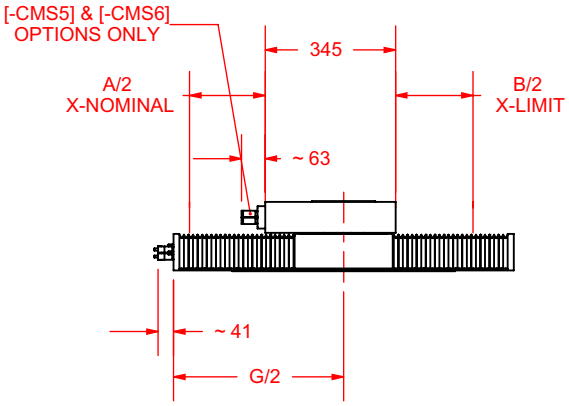
ABL1500WB-B-XY Series DIMENSIONS





CMS CONFIG.	X-AXIS OPTION	Y-AXIS OPTION
1	-CMS2	-CMS4
2	-CMS5	-CMS6
3	-CMS4	-CMS5





** REFER TO ABL1500WB-B SINGLE AXIS CATALOG DRAWING FOR SYSTEM MOUNTING INFORMATION. **

** REFER TO ABL1500-B SINGLE AXIS CATALOG DRAWING FOR TABLETOP MOUNTING INFORMATION. **

MODEL #		A	B	C	D	E	F	G	H	J	K	L	M
X-AXIS	Y-AXIS												
ABL1500WB-B-200	ABL1500-B-050	200	210	255	50	60	105	750	500	167.5	237.5	-	-
ABL1500WB-B-300		300	310	355				900		242.5	312.5		
ABL1500WB-B-400		400	410	455				1080		332.5	402.5		
ABL1500WB-B-500		500	510	555				1240		412.5	482.5		
ABL1500WB-B-200	ABL1500-B-100	200	210	255	100	110	155	750	550	167.5	237.5	-	-
ABL1500WB-B-300		300	310	355				900		242.5	312.5		
ABL1500WB-B-400		400	410	455				1080		332.5	402.5		
ABL1500WB-B-500		500	510	555				1240		412.5	482.5		
ABL1500WB-B-200	ABL1500-B-200	200	210	255	200	210	255	750	730	167.5	237.5	62.5	62.5
ABL1500WB-B-300		300	310	355				900		242.5	312.5		
ABL1500WB-B-400		400	410	455				1080		332.5	402.5		
ABL1500WB-B-500		500	510	555				1240		412.5	482.5		
ABL1500WB-B-200	ABL1500-B-300	200	210	255	300	310	355	750	880	167.5	237.5	137.5	137.5
ABL1500WB-B-300		300	310	355				900		242.5	312.5		
ABL1500WB-B-400		400	410	455				1080		332.5	402.5		
ABL1500WB-B-500		500	510	555				1240		412.5	482.5		

DIMENSIONS: MILLIMETERS

ABL1500WB-B Series ORDERING INFORMATION

Travel (Required)

-200	200 mm travel
-300	300 mm travel
-400	400 mm travel
-500	500 mm travel

Feedback (Required)

-E1	Incremental linear encoder, 1 Vpp amplified sine output
-E2	Incremental linear encoder, 0.1 µm TTL line driver output
-E3	High-accuracy incremental linear encoder, 1 Vpp amplified sine output

Cable Management (Required)

-CMS1	Single axis cable management system
-CMS2	Cable management system for XY assembly
-CMS3	Cable management system for XIO, 2 extra cables, 1 extra air
-CMS4	Cable management system for XYZ assembly
-CMS5	Cable management system for XYIO, 2 extra cables, 1 extra air

Metrology (Required)

-PL1	Metrology, uncalibrated with performance plots
-PL2	Metrology, calibrated (HALAR) with performance plots

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.

Accessories (to be ordered as a separate line item)

ALIGN-NPA	Non-precision XY assembly
ALIGN-PA10	XY assembly; 10 arc sec orthogonality. Alignment to within 7 microns orthogonality for short travel stages.
ALIGN-PA5	XY assembly; 5 arc sec orthogonality. Alignment to within 3 microns orthogonality for short travel stages.
ABF	Air-bearing filtration kit