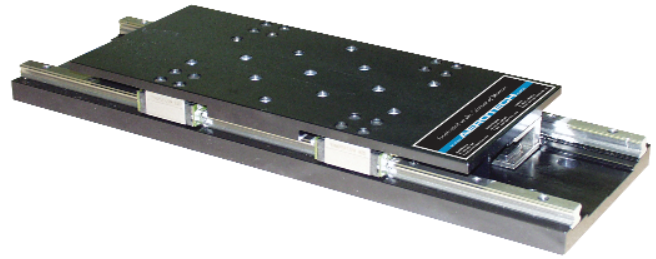# ALS135 Series

Mechanical Bearing Direct-Drive Linear Stage

Direct-drive linear motor for ultra-precise motion

High-accuracy noncontact linear encoder

Outstanding performance in a small footprint

Linear Motor Drive

Unlike many stages that utilize a side-drive lead screw, the ALS135 employs a center-driven, non-cogging linear motor as the driving element. Since the linear motor is a direct-drive device, there is no backlash, windup, or "stiction" that is normally associated with a lead screw or ball screw drive.

The linear motor drive also offers the advantage of higher speeds and accelerations. The compact yet powerful linear motor drives the ALS135 to a peak unloaded acceleration of 1 g and a maximum velocity of 300 mm/s. The result is a high-accuracy device with outstanding throughput that significantly outperforms comparable high-accuracy screw-driven stages.

Outstanding Resolution

For alignment applications, outstanding step-to-step resolution is critical. The ALS135 meets this demand with a resolution of 10 nm when coupled with Aerotech controls. The direct-drive linear motor allows the ALS135 to make precise, small resolution steps. This is particularly important in alignment applications where step accuracy is critical.

Superior Geometry

Aerotech's ultra-stiff construction and compact two-piece design results in a stage with superb geometrical tolerances. As a result, straightness and flatness for the standard stage is $<\pm2$ μm over the entire travel. The effects of Abbe error are nearly eliminated, vastly improving overall system accuracy.

Smooth Travel

Designed for smooth, vibration-free motion, the ALS135 exhibits the outstanding ripple-free motion required for scanning and inspection applications.

Designed for Long Life

Like all stages in the Aerotech product family, the ALS135 was designed for outstanding long-term performance. Both the linear motor and linear encoder are noncontact devices — they not only exhibit long-life, but are totally maintenance free. A moving magnet track design eliminates the need for cable management, further improving long-term reliability.

Precision Alignment

ALS135 series stages are easily configured as XY assemblies. Options include precision orthogonality alignment to 5 arc seconds and available vertical axis solutions.
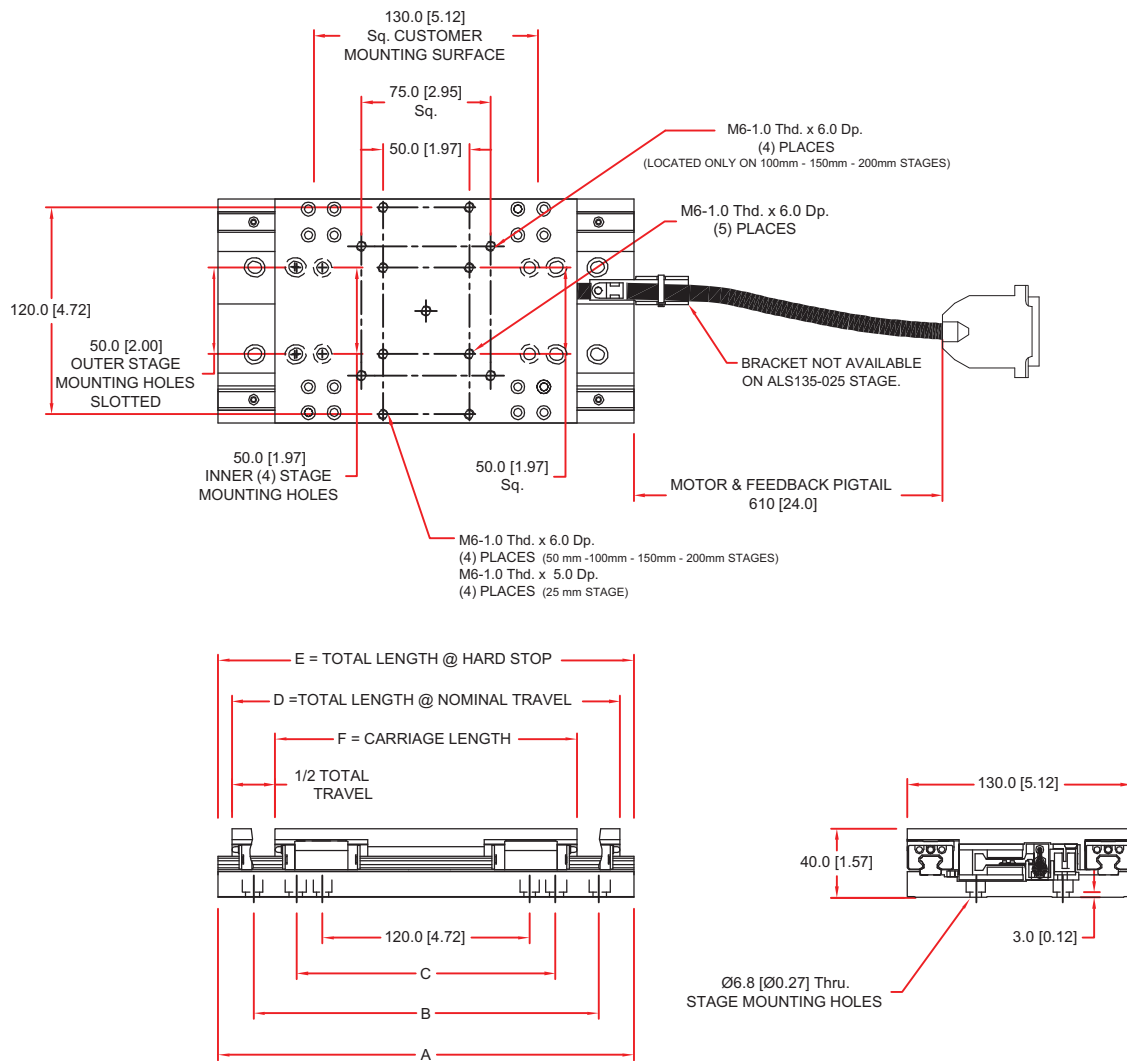
ALS135 Series SPECIFICATIONS

Basic Model		ALS135-025	ALS135-050	ALS135-100	ALS135-150	ALS135-200
Total Travel		25 mm	50 mm	100 mm	150 mm	200 mm
Drive System		Linear Brushless Servomotor (BLMUC-95-A)				
Bus Voltage		Up to 80 VDC with a single 25-pin D connector Up to 160 VDC with split feedback and power – two 25-pin D connectors				
Continuous Current	A_{pk}	2.94				
	A_{rms}	2.08				
Feedback		Noncontact Linear Encoder				
Resolution		0.0025 μm - 1.0 μm				
Maximum Travel Speed[1]		300 mm/s				
Maximum Linear Acceleration		1 g (10 m/s²) (No Load)				
Maximum Load[2]	Horizontal	15.0 kg				
	Side	10.0 kg				
Accuracy	Calibrated[3]	±0.3 μm				
	Uncalibrated	±2.0 μm	±2.0 μm	±4.0 μm	±6.0 μm	±8.0 μm
Repeatability[3]		±100 nm				
Straightness and Flatness	Maximum Deviation	±1 μm	±1.5 μm	±1.5 μm	±2 μm	±2 μm
Pitch		5 arc-sec	6 arc-sec	8 arc-sec	10 arc-sec	12 arc-sec
Roll		5 arc-sec	6 arc-sec	8 arc-sec	10 arc-sec	12 arc-sec
Yaw		5 arc-sec	5 arc-sec	6 arc-sec	7 arc-sec	9 arc-sec
Nominal Stage Weight		2.8 kg	3.0 kg	3.8 kg	4.6 kg	5.4 kg
Moving Mass		0.9 kg	1 kg	1.2 kg	1.4 kg	1.6 kg
Construction		Aluminum Body/Black Anodize Finish				

Notes:
1. Maximum speed based on stage capability. Maximum application velocity may be limited by system data rate and system resolution.
2. Maximum load based on bearing capability. Maximum application load may be limited by acceleration requirements.
3. Value with Aerotech controls and calibration.
4. Specifications are for single-axis systems, measured 25 mm above the tabletop. Performance of multi-axis systems is payload and workpoint dependent. Consult factory for multi-axis or non-standard applications.

ALS135 Series DIMENSIONS

130.0 [5.12]
Sq. CUSTOMER MOUNTING SURFACE

75.0 [2.95] Sq.

50.0 [1.97]

M6-1.0 Thd. x 6.0 Dp.
(4) PLACES
(LOCATED ONLY ON 100mm - 150mm - 200mm STAGES)

M6-1.0 Thd. x 6.0 Dp.
(5) PLACES

120.0 [4.72]

50.0 [2.00]
OUTER STAGE MOUNTING HOLES SLOTTED

BRACKET NOT AVAILABLE ON ALS135-025 STAGE.

50.0 [1.97]
INNER (4) STAGE MOUNTING HOLES

50.0 [1.97] Sq.

MOTOR & FEEDBACK PIGTAIL 610 [24.0]

M6-1.0 Thd. x 6.0 Dp.
(4) PLACES (50 mm -100mm - 150mm - 200mm STAGES)
M6-1.0 Thd. x 5.0 Dp.
(4) PLACES (25 mm STAGE)

E = TOTAL LENGTH @ HARD STOP

D = TOTAL LENGTH @ NOMINAL TRAVEL

F = CARRIAGE LENGTH

1/2 TOTAL TRAVEL

120.0 [4.72]

C

B

A

130.0 [5.12]

40.0 [1.57]

3.0 [0.12]

Ø6.8 [Ø0.27] Thru.
STAGE MOUNTING HOLES

Basic Model	Total Travel	Dimensions - Millimeters [Inches]					
		A	B	C	D	E	F
ALS135-025	25.0 [1.00]	191.2 [7.53]	------	------	175.0 [6.89]	191.1 [7.53]	150.0 [5.91]
ALS135-050	50.0 [2.00]	241.0 [9.49]	------	150.0 [6.00]	225.0 [8.86]	241.0 [9.49]	175.0 [6.89]
ALS135-100	100.0 [4.00]	341.1 [13.43]	250.0 [10.00]	150.0 [6.00]	325.0 [12.80]	341.1 [13.43]	225.0 [8.86]
ALS135-150	150.0 [6.00]	442.7 [17.43]	400.0 [16.00]	200.0 [8.00]	425.0 [16.73]	442.7 [17.43]	275.0 [10.83]
ALS135-200	200.0 [8.00]	544.2 [21.43]	400.0 [16.00]	200.0 [8.00]	525.0 [20.67]	542.0 [21.34]	325.0 [12.80]

ALS135 Series ORDERING INFORMATION

ALS135 Mechanical-Bearing Direct-Drive Linear Stage

-025	25 mm travel
-050	50 mm travel
-100	100 mm travel
-150	150 mm travel
-200	200 mm travel

Feedback (Required)

-E1	Incremental linear encoder, 1 Vpp
-E2	Incremental linear encoder, 1 µm digital TTL output
-E3	Incremental linear encoder, 0.1 µm digital TTL output

Limits (Required)

-LI1	5V limits, normally closed
-LI2	5V limits, normally open

Connectors (Required)

-CN1	Single 25-pin D connector
-CN2	Double 4-pin HPD and 25-pin D connectors

Note: -CN1 option not valid for systems using bus voltages greater than 80 V.

Cable Management (Optional)

-CMS1	Cable management system for lower axis of XY assembly
-CMS2	Cable management system for upper axis of XY assembly

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. This is typically used for spare parts, replacement parts, or items that will not be used or shipped together (ex: stage only). These components may or may not be part of a larger system.