

Planar_{DL} Series

Two Axis, Mechanical Bearing, Linear-Motor Stage

Integrated, low-profile, XY, linear-motor stage

Excellent geometric performance (straightness to $\pm 0.4 \mu\text{m}$; flatness to $\pm 1 \mu\text{m}$)

Anti-creep, precision crossed-roller bearings

Large selection – nine models in travel and accuracy



Aerotech's Planar_{DL} – Superior Planar Performance

Aerotech's Planar_{DL}-series stages offer excellent geometric and dynamic performance in a compact, low-profile package. A variety of travel and performance options make this stage ideal for applications ranging from surface profilometry to LED wafer scribing.

Superior Stage Design

The Planar_{DL} XY design allows for unparalleled planar geometric performance in applications where straightness and flatness of motion are critical. High-precision anti-creep crossed-roller bearings, precision-machined surfaces and Aerotech linear motors driving through the axes' center-of-stiffness result in a positioning stage with exceptional geometric tolerances.

The Planar_{DL} structural elements are optimized for high-dynamics and high-stiffness for the most demanding dynamic applications. Capable of achieving 1 m/s velocities and 1.5 g accelerations, the Planar_{DL} enables high-throughput, high-accuracy processing resulting in superior process yield and a low total cost of ownership. Unlike competitive products using recirculating bearings, the anti-creep crossed-roller bearings used in this design permit smooth motion making this an ideal stage solution for challenging scanning applications.

Noncontact Direct-Drive Technology

Only noncontact, direct-drive technology offers high-speed and accurate positioning coupled with maintenance-free operation and long service life. At the heart of the Planar_{DL}

is Aerotech's proprietary direct-drive technology. This drive technology allows for unmatched performance compared to other competitive screw-based and linear motor designs.

The Planar_{DL}-200XY and -300XY stages are both available with one or two motors per axis, allowing optimization of each individual axis for the specific application and process. Regardless of the number of motors selected, the resulting drive force acts through the centers of friction and stiffness resulting in superior geometric performance and accuracy.

Integrated Cable Management

The cable management system on the Planar_{DL} is integrated into the stage and optimized for long life and performance. Additional standard options are available for extra servo axes or air/vacuum lines for vacuum chucks or other process pneumatics.

Extreme Positioning Performance

The Planar_{DL} is available in three positioning performance options. Relying upon decades of experience in system-level design including not only positioning mechanics, but also software and electronics, Aerotech has developed advanced technologies to push the envelope of precision. High-performance -PLUS and -ULTRA options are available to enable accuracies and straightness values down to $\pm 400 \text{ nm}$ and orthogonality down to 1 arc second.

Planar_{DL} SPECIFICATIONS

Mechanical Specifications	Planar _{DL} -100XY			Planar _{DL} -200XY			Planar _{DL} -300XY			
	-	-PLUS ⁽¹⁾	-ULTRA ⁽⁴⁾	-	-PLUS ⁽¹⁾	-ULTRA ⁽⁴⁾	-	-PLUS ⁽¹⁾	-ULTRA ⁽⁴⁾	
Travel	100 mm x 100 mm			200 mm x 200 mm			300 mm x 300 mm			
Accuracy	±3 µm	±0.4 µm	±0.4 µm	±4 µm	±0.5 µm	±0.5 µm	±5 µm	±0.75 µm	±0.75 µm	
Bidirectional Repeatability ⁽²⁾	±0.1 µm									
Resolution (Minimum Incremental Motion)	3 nm									
Straightness	±1 µm		±0.4 µm	±1.5 µm		±0.5 µm	±2 µm		±0.75 µm	
Flatness	±1 µm			±1.5 µm			±2 µm			
Pitch	12 arc sec			15 arc sec			18 arc sec			
Roll	12 arc sec			15 arc sec			18 arc sec			
Yaw	6 arc sec			8 arc sec			10 arc sec			
Orthogonality	20 arc sec	5 arc sec	1 arc sec	20 arc sec	5 arc sec	1 arc sec	20 arc sec	5 arc sec	1 arc sec	
Maximum Speed	500 mm/s			750 mm/s			1000 mm/s			
Maximum Acceleration (No Load; Upper Axis)	1.5 g			1.0 g (X1 Motor) 1.5 g (X2 Motors)			1.0 g (X1 Motor) 1.5 g (X2 Motors)			
Maximum Force (Continuous)	26 N			31 N (X1 Motor) 62 N (X2 Motors)			78 N (X1 Motor) 156 N (X2 Motors)			
Load Capacity ⁽³⁾	Horizontal	15 kg			20 kg			30 kg		
Moving Mass	Upper Axis	2.9 kg			6.3 kg (-UX1 Motor) 7.4 kg (-UX2 Motor)			16.3 kg (-UX1 Motor) 19.1 kg (-UX2 Motor)		
	Lower Axis	8.4 kg			16.8 kg (-LX1-UX1 Motor) 17.8 kg (-LX1-UX2 or -LX2-UX1 Motor) 19.0 kg (-LX2-UX2 Motors)			45.0 kg (-LX1-UX1 Motor) 48.1 kg (-LX1-UX2 or -LX2-UX1 Motor) 50.9 kg (-LX2-UX2 Motors)		
Stage Mass ⁽⁴⁾	11 kg			23-25 kg			53-63 kg			
Material	Black Anodized Aluminum									
MTBF (Mean Time Between Failure)	30,000 Hours									

Notes:

1. The -PLUS and -ULTRA options require the use of an Aerotech controller.
2. Repeatability specification assumes a feedback resolution of 20 nm or less.
3. On-axis loading for orientation listed.
4. Stage mass a function of motor configuration.
5. Specifications for Base and -PLUS options are per axis measured 25 mm above the tabletop. Specifications for -ULTRA are XY measured 25 mm above the tabletop.

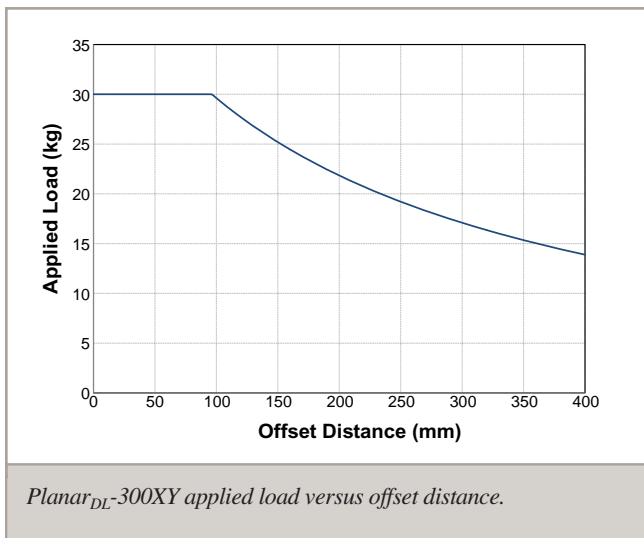
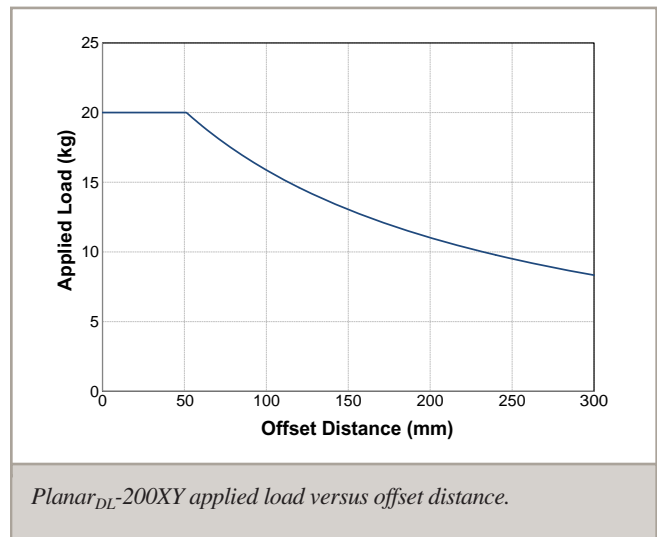
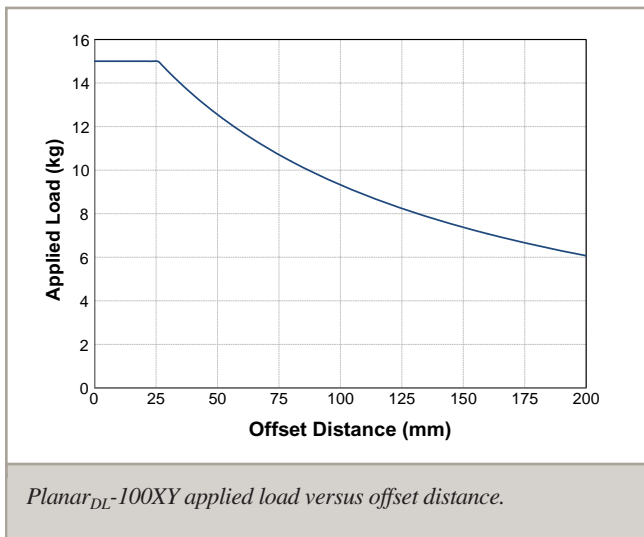


Planar_{DL}-200XY with -CMS2 option.

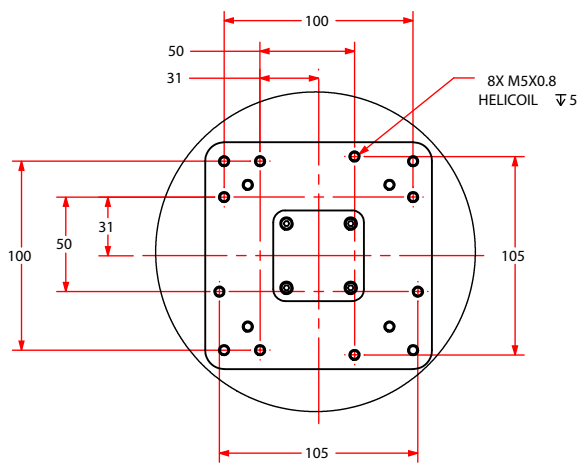
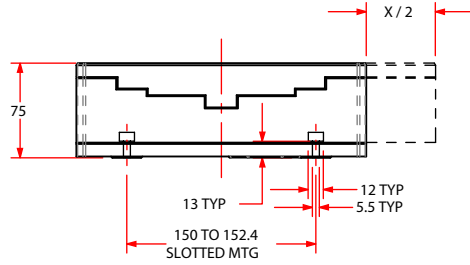
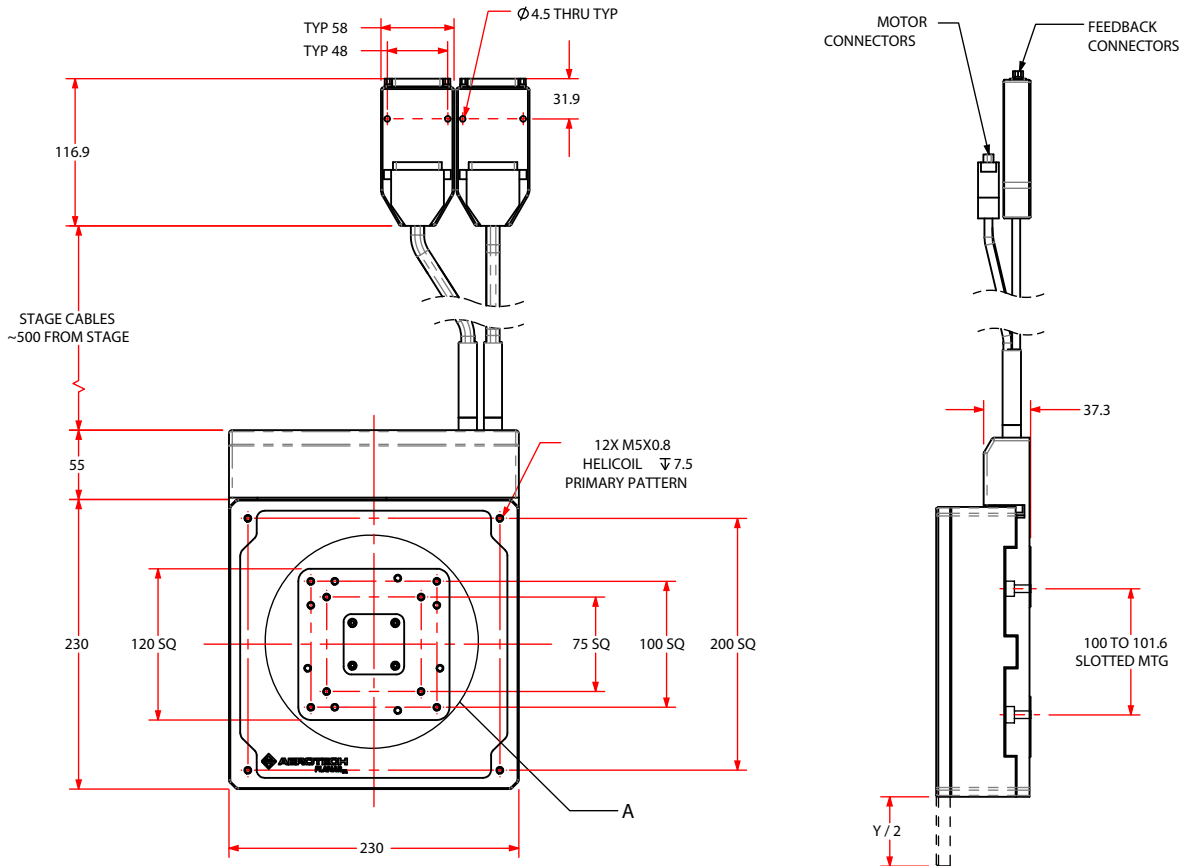
Planar_{DL} SPECIFICATIONS

Electrical Specifications	Planar _{DL} -100XY	Planar _{DL} -200XY	Planar _{DL} -300XY
Drive System	Brushless Linear Servomotor		
Feedback	Noncontact Linear Encoder		
Maximum Bus Voltage	320 VDC		
Limit Switches	5 V, Normally Closed		
Home Switch	Near Center of XY Travel		

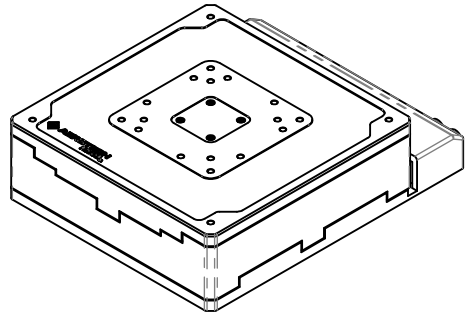
Recommended Controller	Planar _{DL} -100XY	Planar _{DL} -200XY	Planar _{DL} -300XY
Multi-Axis	A3200	Ndrive CL/CP, Ndrive HLe/HPe, Npaq	
	Ensemble	Ensemble CL/CP, Ensemble HLe/HPe	
Single Axis	Soloist	Soloist CL/CP, Soloist HLe/HPe	



Planar_{DL}-100XY-CMSO DIMENSIONS



DETAIL A
AUXILIARY PATTERN
SCALE 1:4

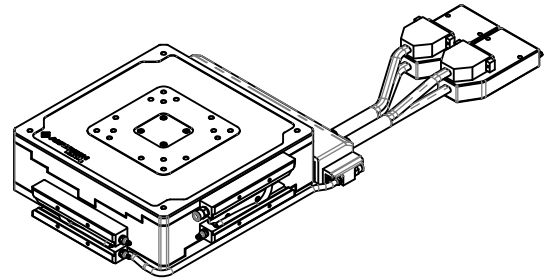
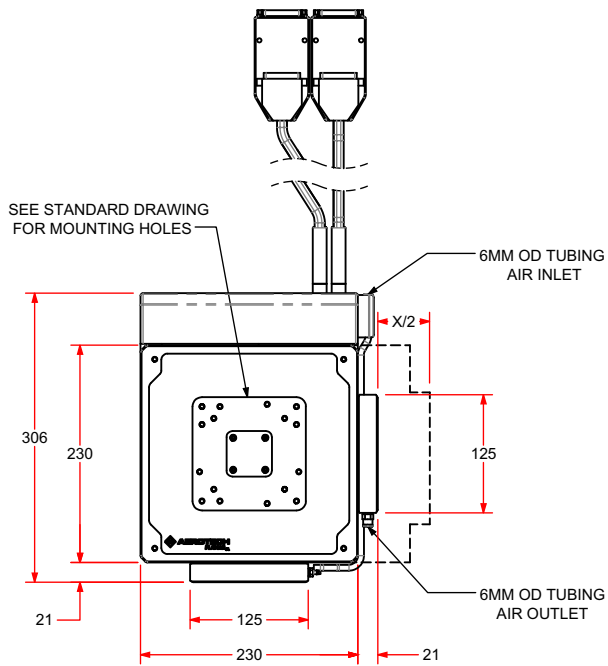


MODEL	XY NOMINAL TRAVEL	XY ELEC LIMIT TRAVEL	XY MECH LIMIT TRAVEL
PLANAR DL-100XY	100	106	110

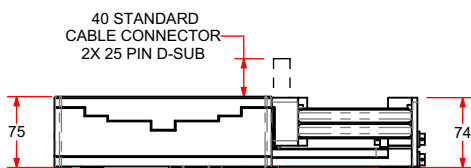
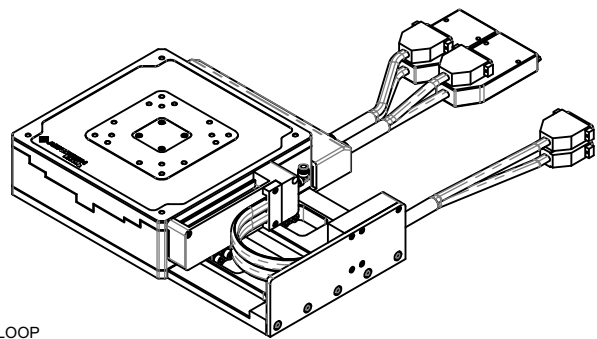
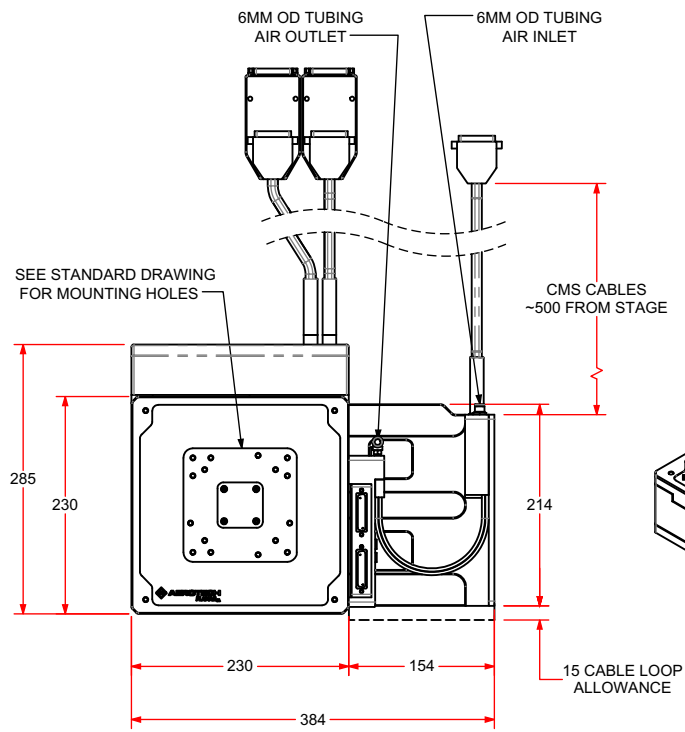
DIMENSIONS: MILLIMETERS

Planar_{DL}-100XY-CMS1/2 DIMENSIONS

-CMS1

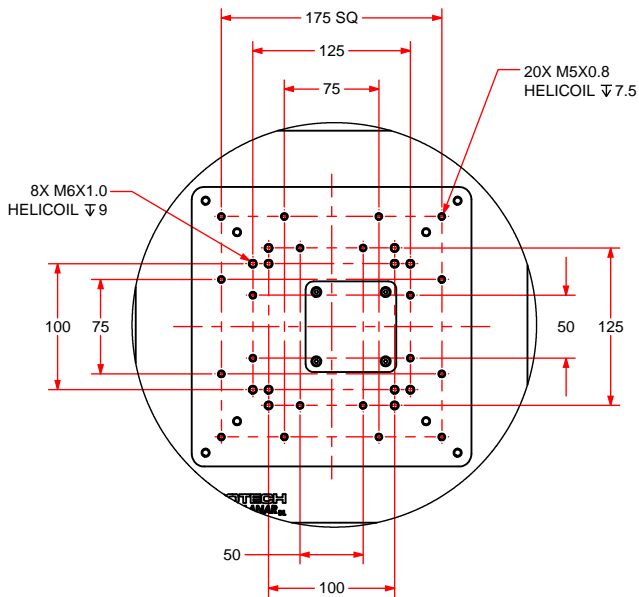
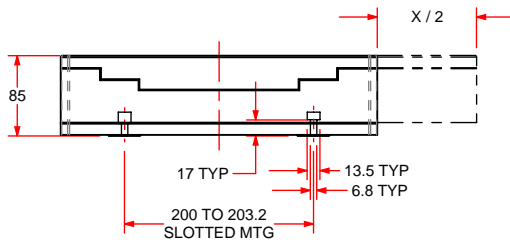
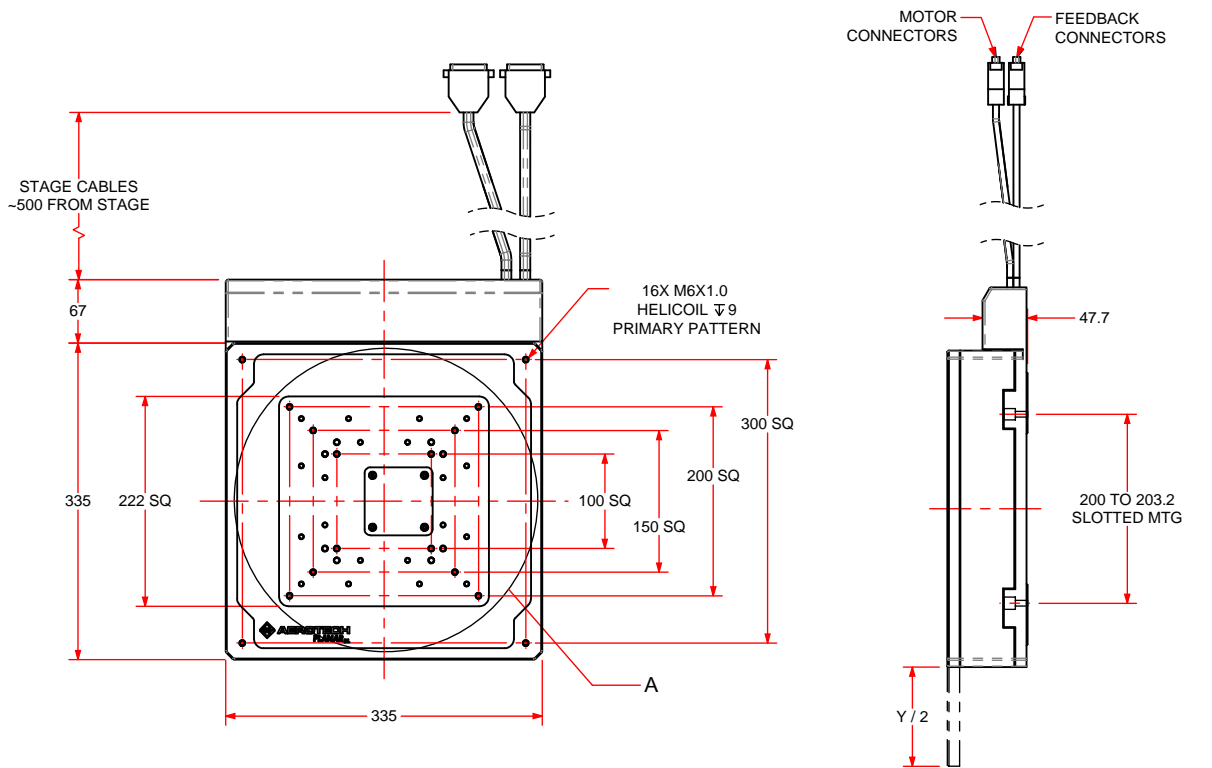


-CMS2

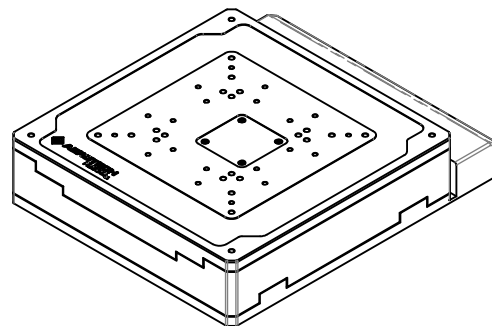


DIMENSIONS: MILLIMETERS

Planar_{DL}-200XY-CMSO DIMENSIONS



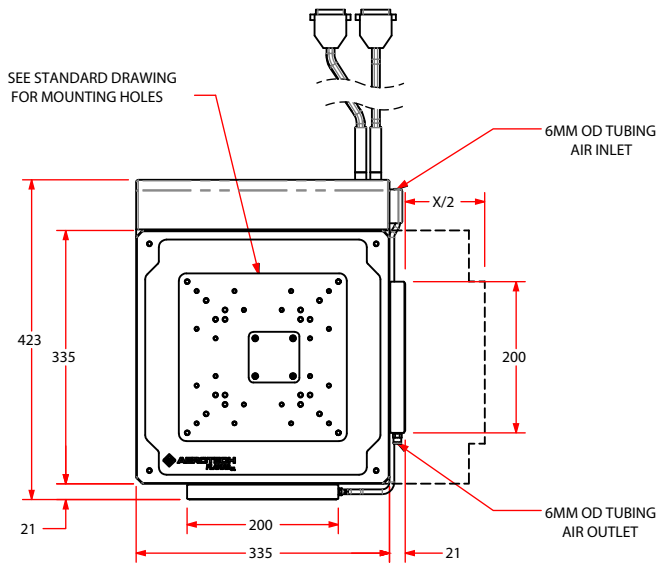
DETAIL A
AUXILIARY PATTERNS
SCALE 1:6



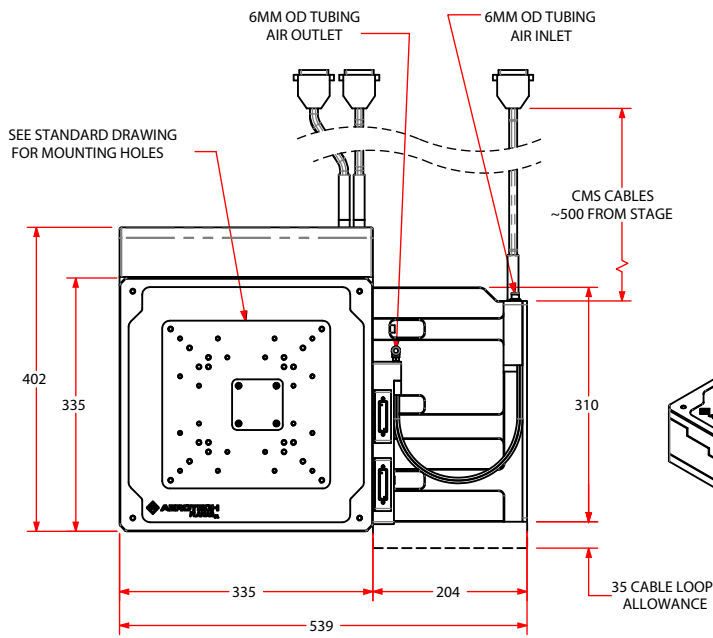
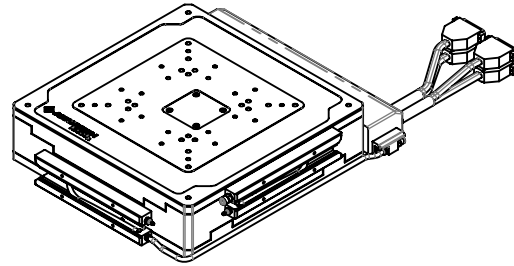
MODEL	XY NOMINAL TRAVEL	XY ELEC LIMIT TRAVEL	XY MECH LIMIT TRAVEL
PLANAR DL-200XY	200	206	210

DIMENSIONS: MILLIMETERS

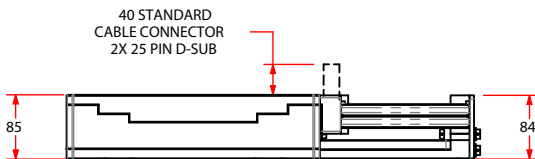
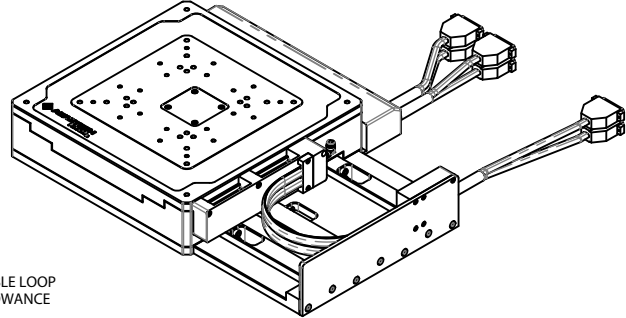
Planar_{DL}-200XY-CMS1/2 DIMENSIONS



-CMS1

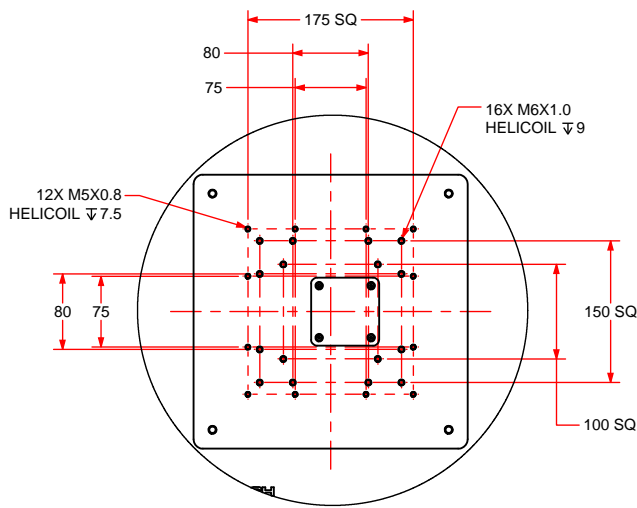
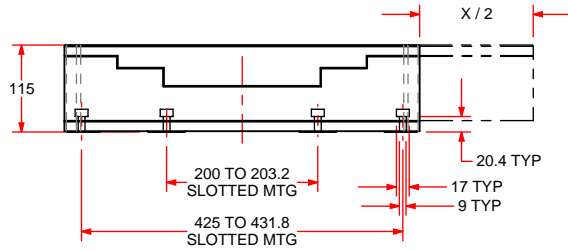
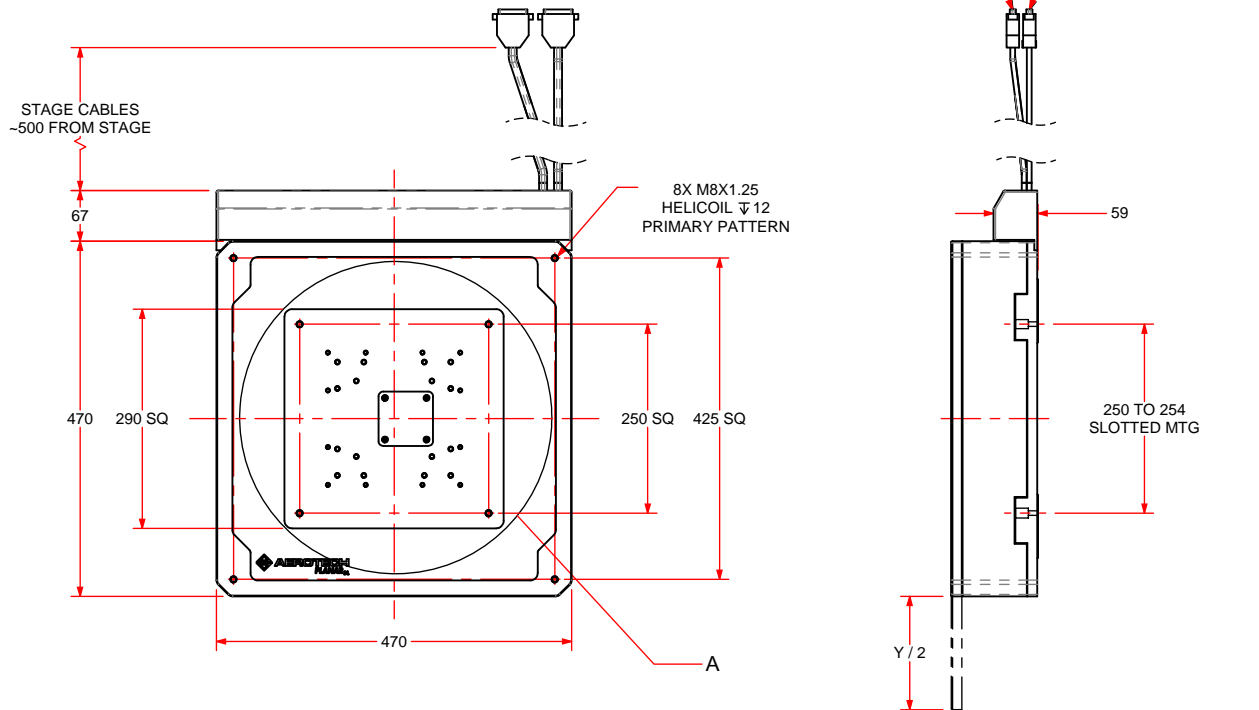


-CMS2

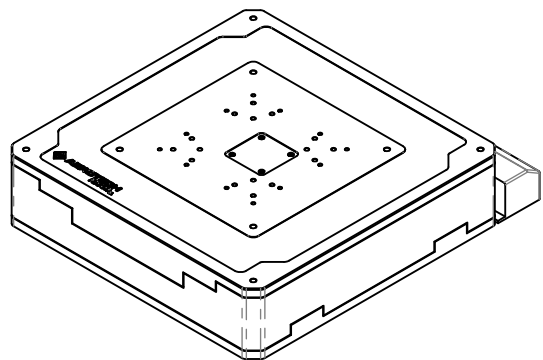


DIMENSIONS: MILLIMETERS

Planar_{DL}-300XY-CMSO DIMENSIONS



DETAIL A
AUXILIARY PATTERNS
SCALE 1:8

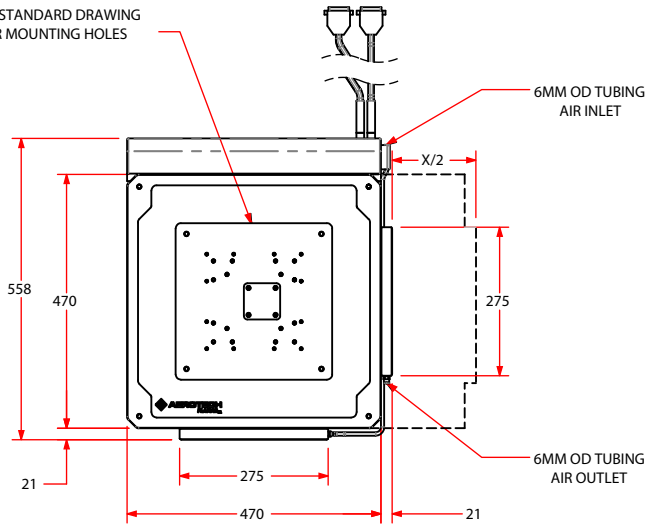


MODEL	XY NOMINAL TRAVEL	XY ELEC LIMIT TRAVEL	XY MECH LIMIT TRAVEL
PLANAR DL-300XY	300	306	310

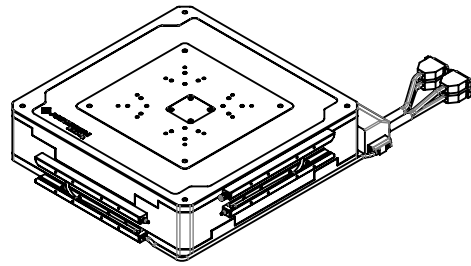
DIMENSIONS: MILLIMETERS

Planar_{DL}-300XY-CMS1/2 DIMENSIONS

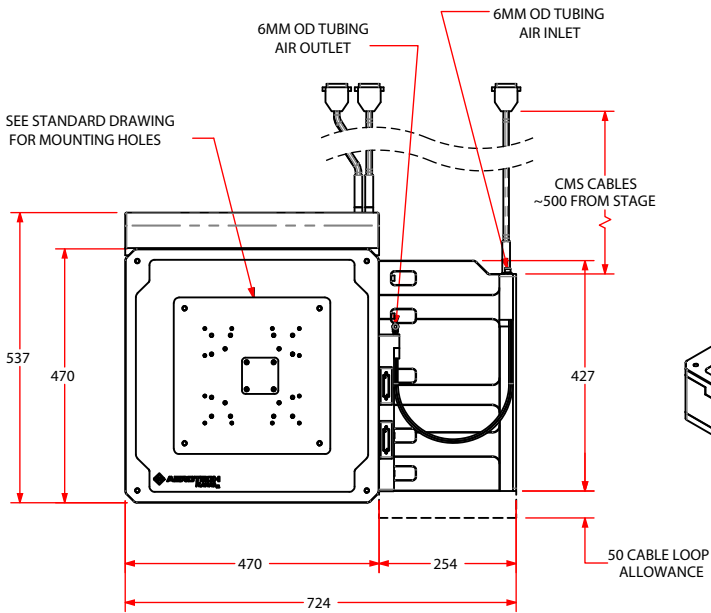
SEE STANDARD DRAWING FOR MOUNTING HOLES



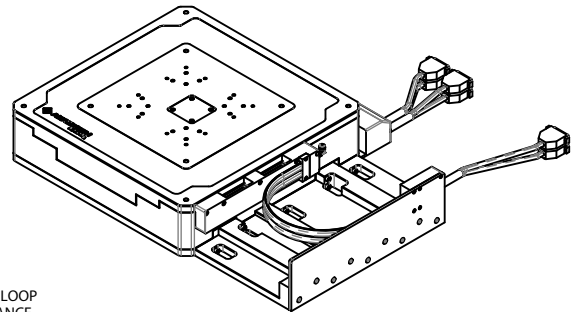
-CMS1



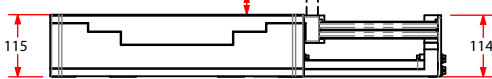
SEE STANDARD DRAWING FOR MOUNTING HOLES



-CMS2



40 STANDARD CABLE CONNECTOR 2X 25 PIN D-SUB



DIMENSIONS: MILLIMETERS

Planar_{DL} ORDERING INFORMATION

Planar_{DL}-series XY Stage

Planar _{DL} -100XY	Linear motor XY table; 100 mm x 100 mm travel
Planar _{DL} -200XY	Linear motor XY table; 200 mm x 200 mm travel
Planar _{DL} -300XY	Linear motor XY table; 300 mm x 300 mm travel

CMS Options (Required)

-CMS0	No cable management for third axis on top of XY
-CMS1	Cable management for air/vacuum line for vacuum chuck or process pneumatics
-CMS2	Cable management for motor/feedback and air/vacuum line for third axis on top of the XY

Motor Configuration (Required) - Not Applicable for Planar_{DL}-100XY

-LX1-UX1	1 motor on lower-axis; 1 motor on upper-axis
-LX1-UX2	1 motor on lower-axis; 2 motors on upper-axis
-LX2-UX1	2 motors on lower-axis; 1 motor on upper-axis
-LX2-UX2	2 motors on lower-axis; 2 motors on upper-axis

Lower-Axis Encoder (Required)

-L-LTAS	Lower-axis glass-scale linear encoder; amplified sine output 1 V _{pp} (20 μm signal period)
-L-LTX50	Lower-axis glass-scale linear encoder; 0.1 μm line-driver output after quadrature

Upper-Axis Encoder (Required)

-U-LTAS	Upper-axis glass-scale linear encoder; amplified sine output 1 V _{pp} (20 μm signal period)
-U-LTX50	Upper-axis glass-scale linear encoder; 0.1 μm line-driver output after quadrature

Performance (Optional) - Requires Aerotech Controller

-PLUS	High-accuracy performance option
-ULTRA	Ultra-high accuracy 2D performance option