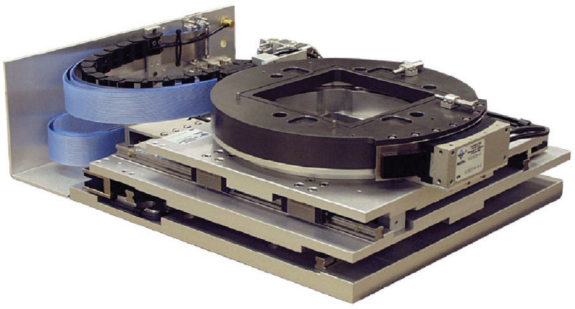
MaskAlign Series

Photomask Alignment System

- Three-axis photomask alignment stage
- Standard interface for six or eight-inch masks
- Integral vacuum groove for mask retention
- Low profile for easy integration into optics train
- Direct-drive brushless servomotors



Introduction

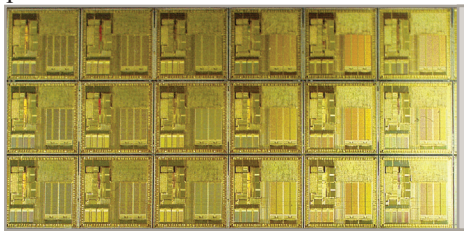
Aerotech's MaskAlign series stage is a high-performance photomask-aligning system designed to meet the exacting requirements of advanced semiconductor and flat panel writing systems. The MaskAlign incorporates proprietary drive technology and offers best-in-class speed, resolution, accuracy, and repeatability.

Mask Alignment and Retention

The MaskAlign has a built-in alignment system that guarantees proper mask placement with minimal effort. Fixed pins are used to set the mask location while two locating mechanisms push the mask into its final position. Once the mask is properly aligned, an integral vacuum channel holds the mask in place. All of these features assure proper mask alignment and retention during the writing process.

Noncontact Direct-Drive

Only noncontact direct-drive technology offers the robust, accurate, and high-speed positioning necessary for mass production of precision devices. The X and Y axes use Aerotech's brushless linear motors for non-cogging, noncontact, high-performance positioning. The theta axis uses a proprietary curvilinear motor based on Aerotech's world-class linear motors. This complete direct-drive solution ensures a robust system with the highest performance available.



Aerotech's MaskAlign 100 series is a high-performance photomask positioner.

Precision Positioning

The compact integrated design has an inherent advantage over stacked systems — since the overall height is reduced, so are the effects of Abbe error. But even with a compact design, the MaskAlign still provides up to 150 mm of xy motion and 20 degrees of theta motion.

The MaskAlign also uses a very flexible cable management system (CMS). The horizontal CMS allows larger bend radii which significantly increases cable life while at the same time minimizes total overall height. This system also makes all interconnections very simple and straightforward. This is accomplished with a single bracket that keeps all electrical and pneumatic connectors in one convenient location.

Robust Design

Aerotech has a long history of designing and building motion control and positioning components, as well as complete positioning systems. This knowledge is applied to each of our components and systems, resulting in robust designs that are meant to function continuously in a production environment.

Flexible Configurations and Custom Designs

Aerotech manufactures a wide range of servo amplifiers and advanced controllers to provide a complete, integrated package. In addition, custom systems are routinely designed, manufactured, tested, and certified to customer specifications.

MaskAlign Series SPECIFICATIONS

MaskAlign 100	Axis 1 (X) Upper Linear Axis	Axis 2 (Y) Lower Linear Axis	Axis 3 (Theta)
Travel	100 mm (upper axis)	100 mm (lower axis)	20 degrees
Aperture	120 mm square with XY stage at mid-travel; 70 mm sqaure with XY stage at extents of travel		
Accuracy [1]	±1 µm	±1 µm	±1.5 arc sec
Repeatability[1]	±0.5 µm	±0.5 µm	±0.5 arc sec
Straightness	±1.5 µm	±1.5 µm	NA
Flatness	±1.5 µm	±1.5 µm	NA
Pitch (arc sec)	±4 arc sec	±4 arc sec	NA
Yaw (arc sec)	±4 arc sec	±4 arc sec	NA
Maximum Load	2 kg		
XY Orthogonality	5 arc sec		
Moving Mass	8.8 kg	14.6 kg	NA
Stage Mass	19 kg		

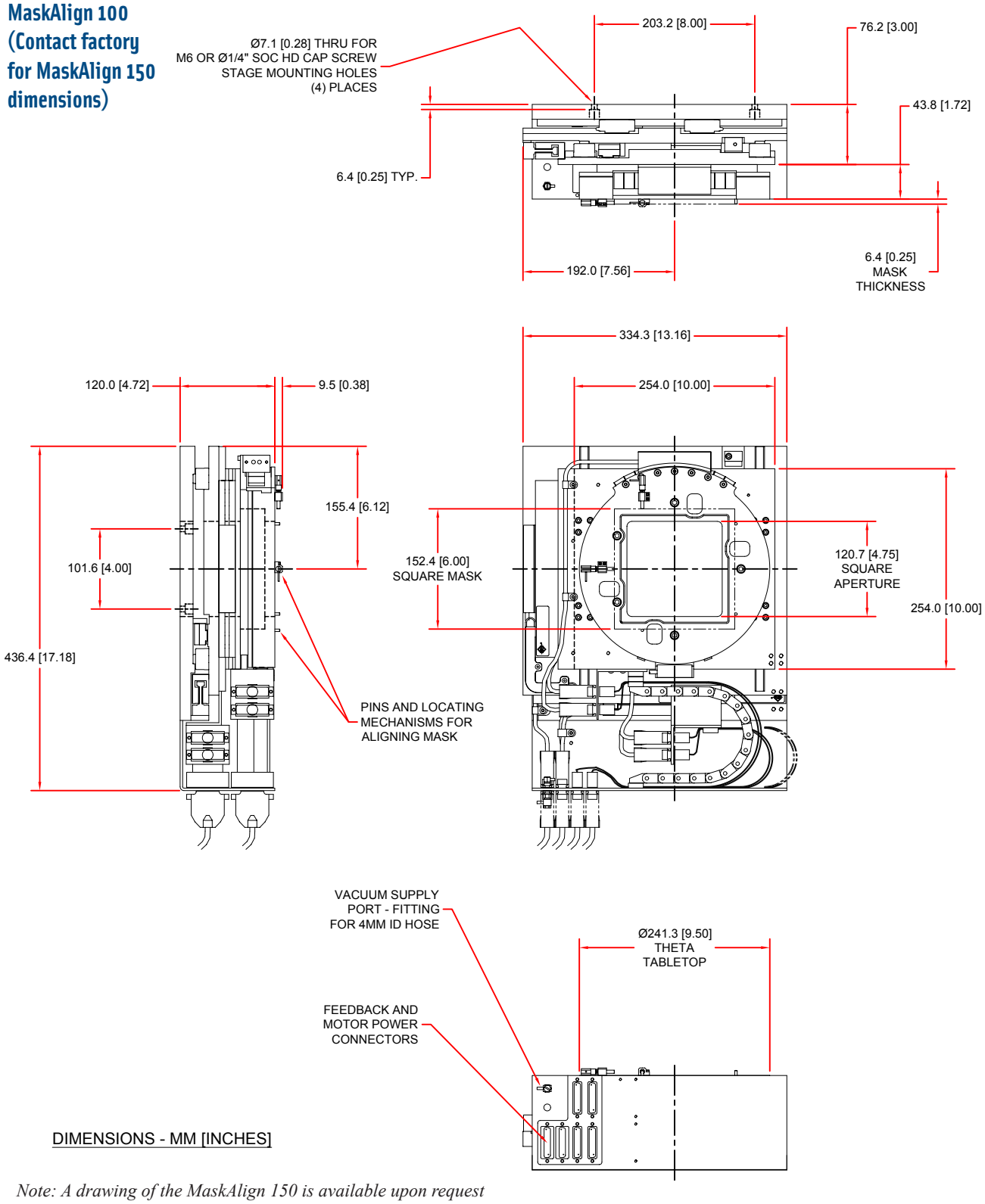
Notes:
1. Values with Aerotech controls and calibration

MaskAlign 150	Axis 1 (X) Upper Linear Axis	Axis 2 (Y) Lower Linear Axis	Axis 3 (Theta)
Travel	150 mm (upper axis)	150 mm (lower axis)	20 degrees
Aperture	170 mm square with XY stage at mid-travel; 70 mm square with XY stage at extents of travel		
Motor Type	BLMUC-111-A (single motor)	BLMUC-143-A (single motor)	Custom BLMUC-111-A (curvilinear)
Accuracy [1]	±1 µm	±1 µm	±1.5 arc sec
Repeatability[1]	±0.5 µm	±0.5 µm	±0.5 arc sec
Straightness	±2.5 µm	±2.5 µm	NA
Flatness	±2.5 µm	±2.5 µm	NA
Pitch (arc sec)	±6 arc sec	±6 arc sec	NA
Yaw (arc sec)	±6 arc sec	±6 arc sec	NA
Maximum Load	5 kg		
XY Orthogonality	5 arc sec		
Moving Mass	9.2 kg	15.7 kg	NA
Stage Mass	22 kg		

Notes:
1. Values with Aerotech controls and calibration

MaskAlign Series DIMENSIONS

MaskAlign 100 (Contact factory for MaskAlign 150 dimensions)



DIMENSIONS - MM [INCHES]

Note: A drawing of the MaskAlign 150 is available upon request

MaskAlign Series ORDERING INFORMATION

MaskAlign Mask Translator

MaskAlign	Direct-drive XYT mask alignment stage

Travel (Required)

-100	100 mm of XY travel
-150	150 mm of XY travel

Limits (Required)

-LI1	Normally closed end of travel limit switches (STANDARD)
-LI2	Normally open end of travel limit switches

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.