

MBT Series MicroBlock 3-Axis Flexure Stage

User Guide



Original Instructions

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Chapter 1 Introduction

1.1 Description of the MicroBlock 3-Axis Flexure Stage

The MicroBlock™ is a versatile, independent three-axis nanopositioning stage which has been developed to meet the stringent requirements associated with aligning fiber optics. The top-mounting platform can be adjusted along three translational axes — x, y, and z — with respect to the base. It features a nominal working platform height of 62.5 mm and provides a common optical-axis height of 75 mm.

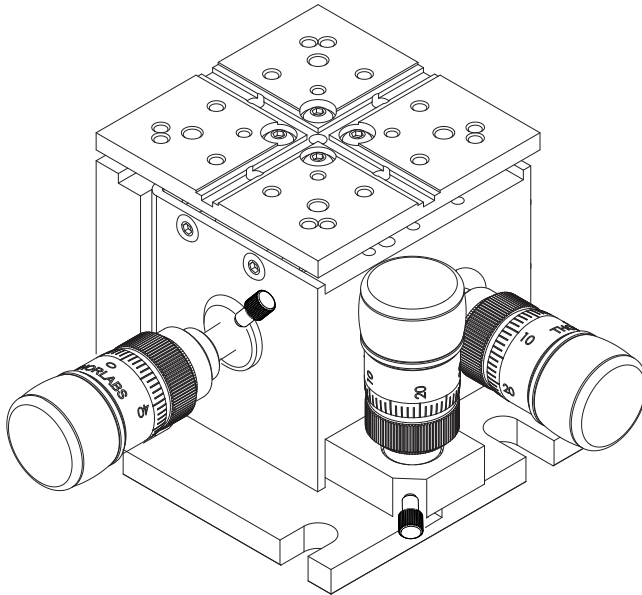


Fig. 1.1 MBT616D MicroBlock with micrometer actuators

1.2 Drives

The MicroBlock is available with a choice of drives, a differential micrometer drive (MBT616D) and a thumbscrew drive (MBT602).

The differential micrometer has 4mm of fine position adjustment with 0.5 mm travel per revolution, and 300 μ m of ultra fine adjustment, with 50 μ m per revolution making it ideal for aligning single-mode fibers. The simpler thumbscrew, fine-threaded drives for use with less demanding multimode fiber-optic systems provide 4 mm of fine position adjustment with a 500 μ m travel per revolution.

1.3 Accessories

A comprehensive range of accessories is available to allow the MicroBlock to hold and manipulate optical fibers, diode lasers, gradient-index lenses, spherical ball lenses, and other commonly used optical components. The accessories are mounted to the top platform using a tongue-in-groove system and are retained with cleats and capscrews – see Fig. 1.2. Three extended top platforms are also available for use when end-firing or butt-coupling to small lightwave devices.

A platform bracket can be attached to the side of the MicroBlock to provide a fixed-world platform adjacent to the moving platform – see Fig. 1.3. This allows accessories to be mounted at the fixed optical axis height of 75mm, adjacent to the accessories being translated. Alternatively, the top plate can be replaced with the AMA011 right angle top plate, which provides a convenient, vertical mounting surface for attaching other components or accessories to the stage.

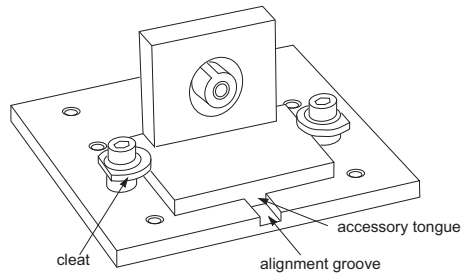


Fig. 1.2 Tongue-in-groove system

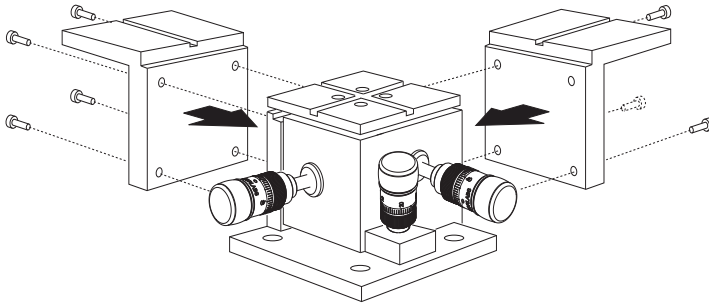


Fig. 1.3 Fixed platform bracket

A series of pre-configured fiber launch systems is also available - search fiber launch systems at www.thorlabs.com for further details.

Chapter 2 Safety

2.1 Safety Information

For the continuing safety of the operators of this equipment, and the protection of the equipment itself, the operator should take note of the **Warnings, Cautions** and **Notes** throughout this handbook and, where visible, on the product itself.

The following safety symbols may be used throughout the handbook and on the equipment itself.

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Warning: Risk of Electrical Shock

Given when there is a risk of injury from electrical shock.



Warning

Given when there is a risk of injury to users.



Caution

Given when there is a risk of damage to the product.

Note

Clarification of an instruction or additional information.

2.2 General Warnings



Warning

If this equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

Spillage of fluid, such as sample solutions, should be avoided. If spillage does occur, clean up immediately using absorbent tissue. Do not allow spilled fluid to enter the internal mechanism.

Chapter 3 Operation

3.1 Using Micrometer Drives

The unit is shipped with the top platform at the nominal position (i.e. center of travel). Turning the actuator gives ± 2 mm of travel from this nominal position.

All axes have travel-limiting stops to prevent overdriving. When the travel limit is reached do not continue to drive the stage. The direction of travel of the actuators to reach the travel limits is shown in Fig. 3.1.

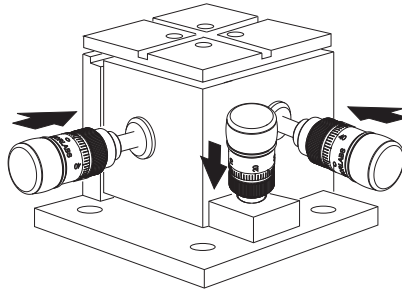


Fig. 3.1 Actuator travel to reach travel stops

The micrometer drives are marked with a graduated scale, as shown in Fig. 3.2.

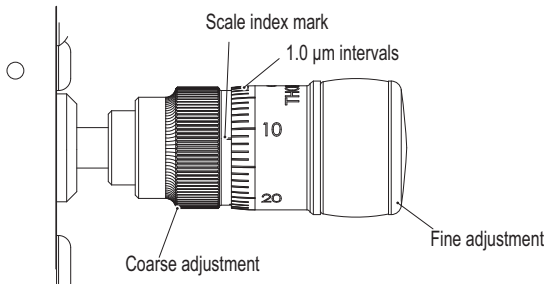


Fig. 3.2 Reading micrometer drives

3.2 Stage Orientation



Caution

The stage is designed to be mounted horizontally as shown in the images throughout this manual. Internally, a series of springs provides the pre-load for the actuators and this pre-load will be reduced or removed if the stage is mounted in any orientation other than horizontal, which may result in degraded performance.

Chapter 4 Installation

4.1 Unpacking



Caution

Once removed from its packaging, the MicroBlock is easily damaged by mishandling. The unit should only be handled by its base, not by the top platform or any attachments to the top platform.

Note

Retain the packing in which the unit was shipped, for use in future transportation.

The stage is shipped with a transit locking plate fitted which must be removed before the stage can be used - see Fig. 4.1. Two knurled locking screws are also included. The shorter screw can be fitted once the transit plate has been removed, to lock the actuator position. The longer locking screw performs the same function when an AMA009 or AMA007 mounting bracket is fitted.

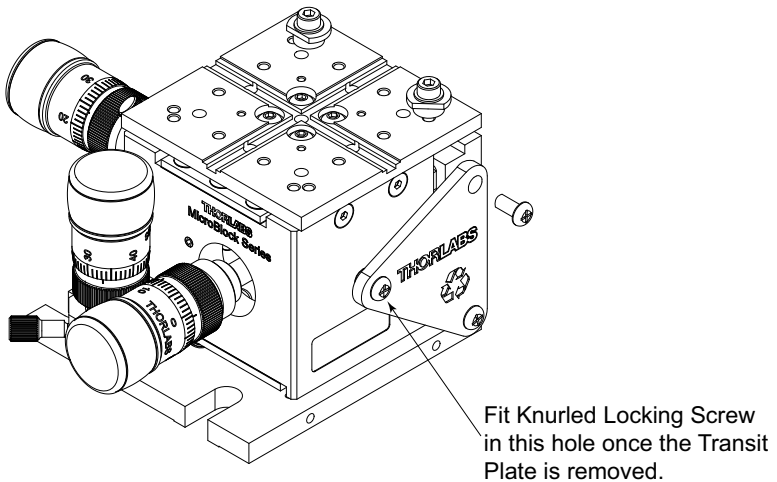


Fig. 4.1 Removing the Transit Locking Plate

4.2 Attaching to a Work Surface

The base of the MicroBlock is provided with a number of fixing holes and slots for attachment to metric or inch optical tables, as supplied by Thorlabs and other manufacturers. Bolting the unit down minimizes the risk of damage.

When mounting the MicroBlock close to other equipment, ensure that the travel of the moving platform is not obstructed. If the moving platform is driven against a solid object, damage to the internal flexures could occur. The range of travel on each axis is 4 mm total, that is ± 2 mm about the nominal position.

4.3 Fitting an Extended Top Platform

The extended top platform is available in three lengths: AMA001 85mm, AMA003 95mm and AMA003 105mm. They are convenient for attaching components or accessories which need to reach into smaller spaces.

To fit an extended top plate:

- 1) Remove the four retaining screws (see Fig. 4.2).
- 2) Remove the top plate and fit the extended top plate.
- 3) Refit the screws removed at item (1) and tighten to 85cNm (7.5 lb in).

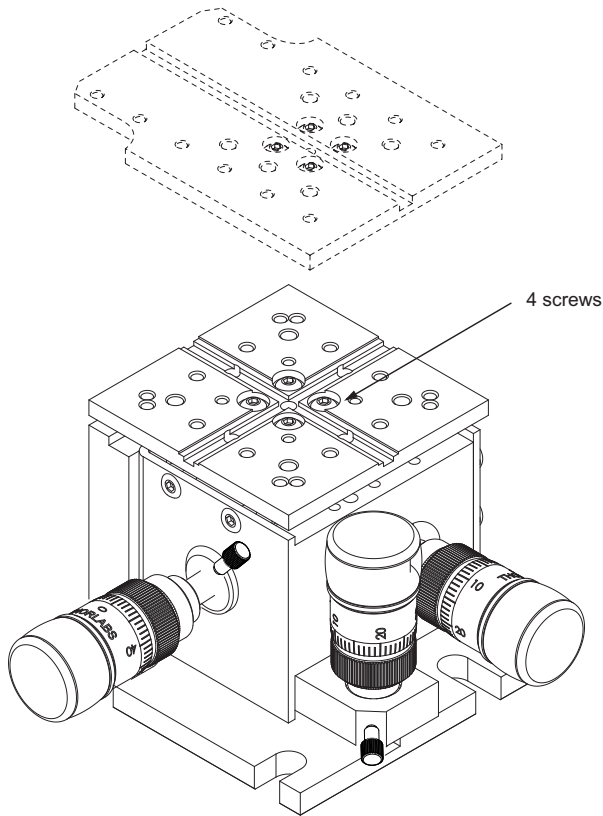


Fig. 4.2 Fitting an extended top platform

4.4 System Stability

The MicroBlock has been designed using traditional precision engineering techniques combined with flexure technology for precise, stable and frictionless motion. Extreme care and precise matching of tolerances and components coupled with the fine thread adjusters or differential micrometer drives, ensure that MicroBlock provides the best possible positional accuracy and stability.

The threads used for the drive screws are very finely made with the correct clearances and lubrication. The lubricants and choice of material employed in the design and manufacture are critical to the performance and stability of the MicroBlock. Changing the thread lubricant may adversely affect the performance of the whole system.

4.5 Mounting Equipment to the Moving Platform



Caution

To avoid damaging the internal flexures:

The weight attached to the moving platform must not exceed 1 kg.

Do not apply excessive forces to the moving platform.

When mounting devices to the stage, do not use screws which protrude into the internal mechanism.

Thorlabs manufacture a variety of fibre chucks, holders and fixtures to fit the MicroBlock stage, which are mounted on the top platform.

4.6 Transportation



Caution

When packing the unit for shipping, use the original packing.

If this is not available, use a strong box and surround the MicroBlock with at least 100 mm of shock absorbent material.

4.7 Dimensions

4.7.1 Top platform

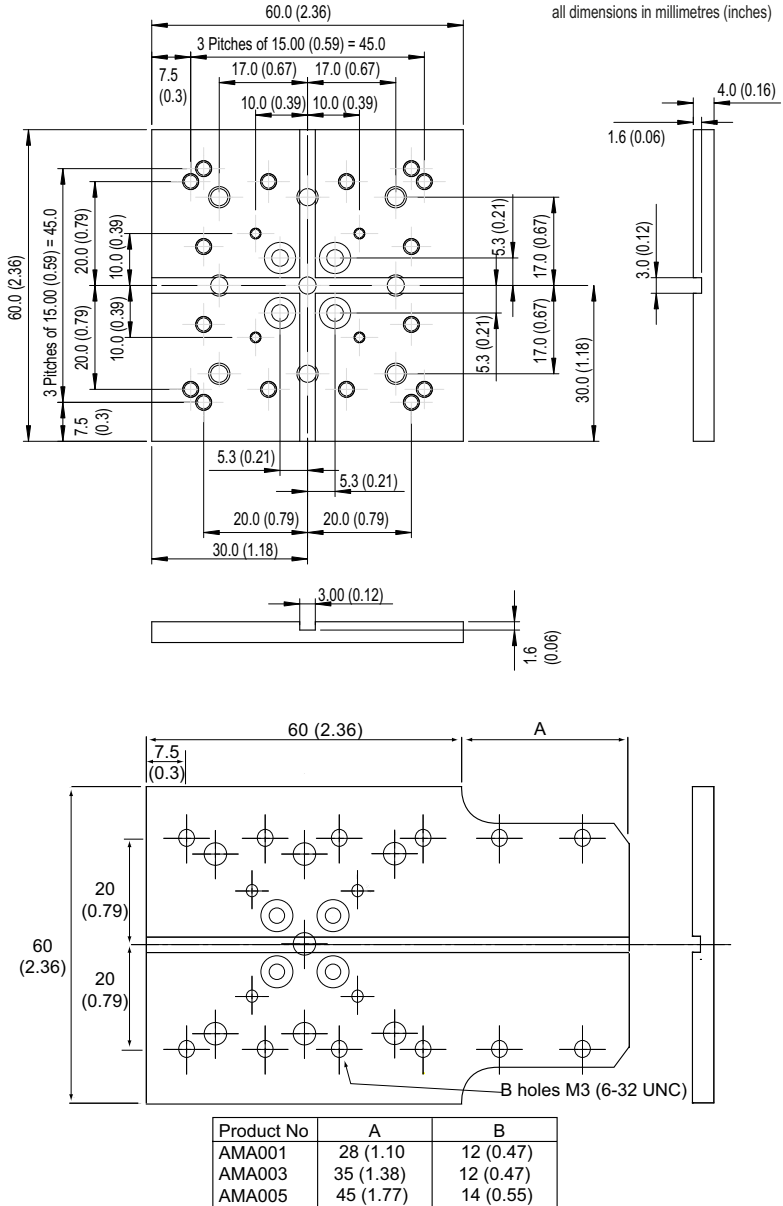


Fig. 4.3 Top platform

Chapter 5 Specification and Parts List

5.1 Specification

| Parameter | Value |
|---------------------------------------|--|
| Weight (including drives and fixings) | MBT602: 626 g MBT616D: 750 g |
| Load capacity | 1 kg |
| Total Travel | ±2 mm |
| Total Differential Travel | 300 µm |
| Travel per revolution of actuator | Fine thread: 0.5 mm Differential: 50 µm |