DTS25V(/M) and DTS50V(/M) 1"(25 mm) and 2"(50 mm) Vacuum-Compatible Translation Stages

User Guide



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Chapter 1 Introduction

1.1 Intended Use

The DTS25V(/M) and DTS50V(/M) are vacuum-compatible dovetail translation stages that are entry-level positioners for use in general-purpose positioning applications. Any other use will invalidate the warranty.

1.2 Explanation of Safety Warnings

⚠CAUTION Caution indicates a hazard with a low level of risk that, if not avoided, could result in minor or moderate injury.

NOTICE Indicates information considered important, but not hazard-related, such as possible damage to the product.

Warning

CE UKCA The CE/UKCA markings on the product are the manufacturer's declaration that the product complies with the essential requirements of the relevant European health, safety, and environmental protection legislation.

The symbol on the product, the accessories, or packaging indicates that this device must not be treated as unsorted municipal waste but must be collected separately.

1.3 Description

The DTS25V(/M) and DTS50V(/M) are vacuum-compatible dovetail translation stages that provide travel ranges of 1" (25 mm) and 2" (50 mm), respectively. Each has an adjuster with 0.04" (1.0 mm) travel per revolution. The design uses a precision-rolled M6 x 1.0 mm-pitch leadscrew for smooth linear positioning across the entire travel range. The moving platform is lockable with a side-mounted screw to prevent accidental movement. A graduated scale is etched onto each side of the moving platform where the locking plates can be located. The DTS25V imperial stage has graduations spaced at 1/40" (0.025"), while the DTS50V imperial stage uses graduations spaced at 1/20" (0.05"). The DTS25V/M and DTS50V/M metric stages feature graduations spaced at 1.0 mm. The stages can be used in a vacuum environment down to 10^{-6} Torr between 10 to 130 °C.

1.4 Configuration

The DTS25V(/M) and DTS50V(/M) stages can be bolted directly to a vacuum-compatible breadboard, such as our MB6S passivated stainless steel breadboard, or they can be secured using four CL6V clamps (two on each side). The modular design allows multiple stages to be assembled into 2- and 3-axis configurations. The DTSA03V(/M) angle bracket can be used for applications requiring vertical mounting such as XZ and XYZ orientations. Dowel pins are included with each stage purchase to ensure the stages remain perpendicular and aligned with the direction of translation. See Section 3.4 for more information on mounting and multi-axis configurations.

1.4.1 Specifications

Item #	DTS25V(/M)	DTS50V(/M)
Travel Range	1" (25 mm)	2" (50 mm)
Travel per Revolution	0.04" (1.0 mm)	
Horizontal Load Capacity	88 lbs (40 kg)	
Vertical Load Capacity	22 lbs (10 kg)	
Angular Deviation	±250 µrad	Pitch ±300.00 µrad Yaw ±800.00 µrad
Straightness	Horizontal ±10.00 µm Vertical ±5.00 µm	Horizontal ±27.50 µm Vertical ±12.50 µm
Stiffness	Pitch 200.00 µrad/N·m Yaw 725.00 µrad/N·m	Pitch 220.00 µrad/N·m Yaw 490.00 µrad/N·m
Vacuum Rating	10^{-6} Torr	
Operating Temperature Range	10 to 130 °C (50 to 266 °F)	
Maximum Baking Temperature[a]	130 °C (266 °F)	
Storage Temperature	10 to 40 °C with <70% Humidity	
Weight	0.53 lbs (0.24 kg)	0.68 lbs (0.31 kg)

a. Baking these stages under HV or UHV conditions may cause metal vapor to contaminate the vacuum chamber or potentially compromise the stages' mechanical integrity.

1.4.2 Mechanical Drawings

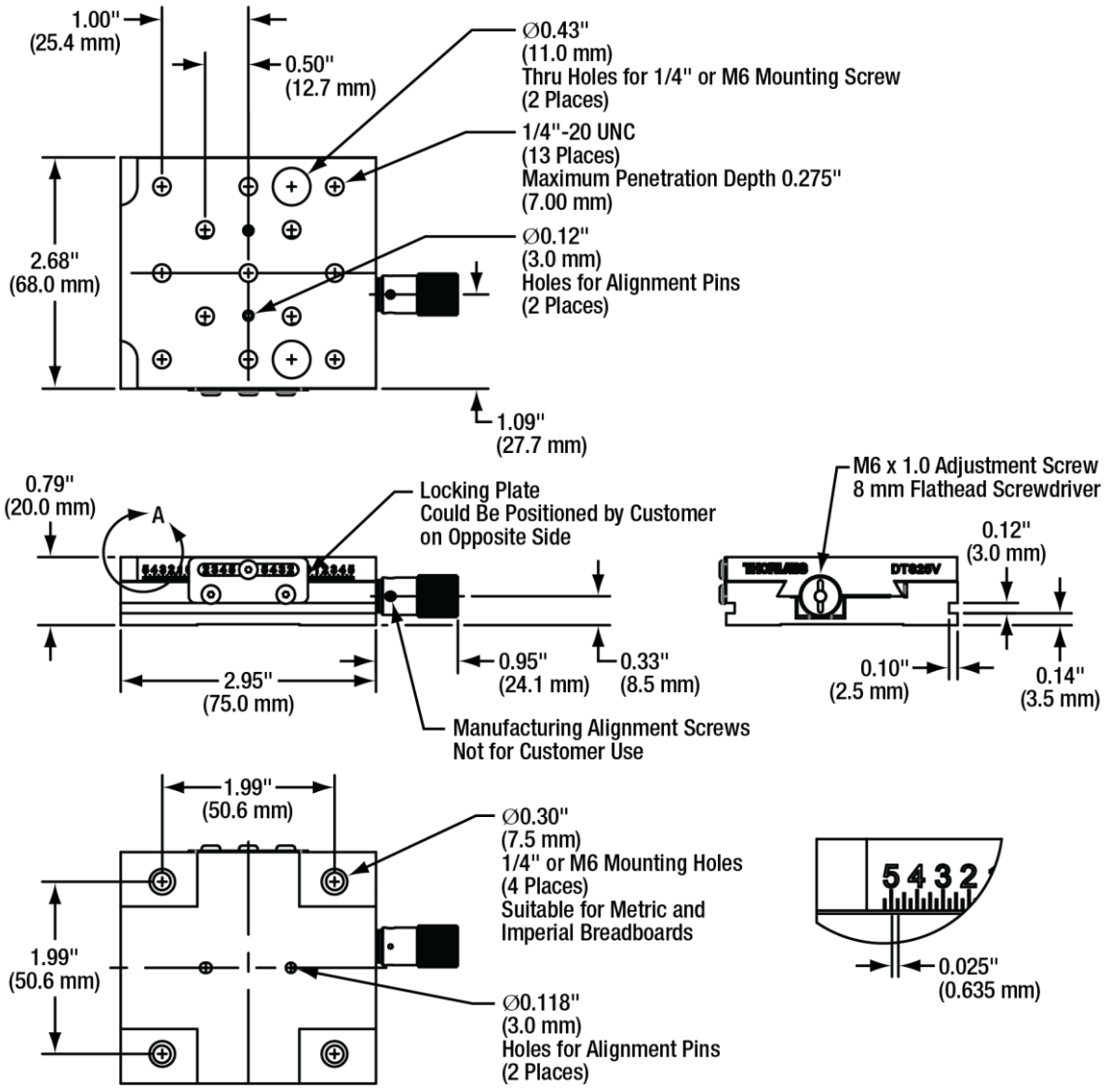


Figure 1 DTS25V Mechanical Drawing

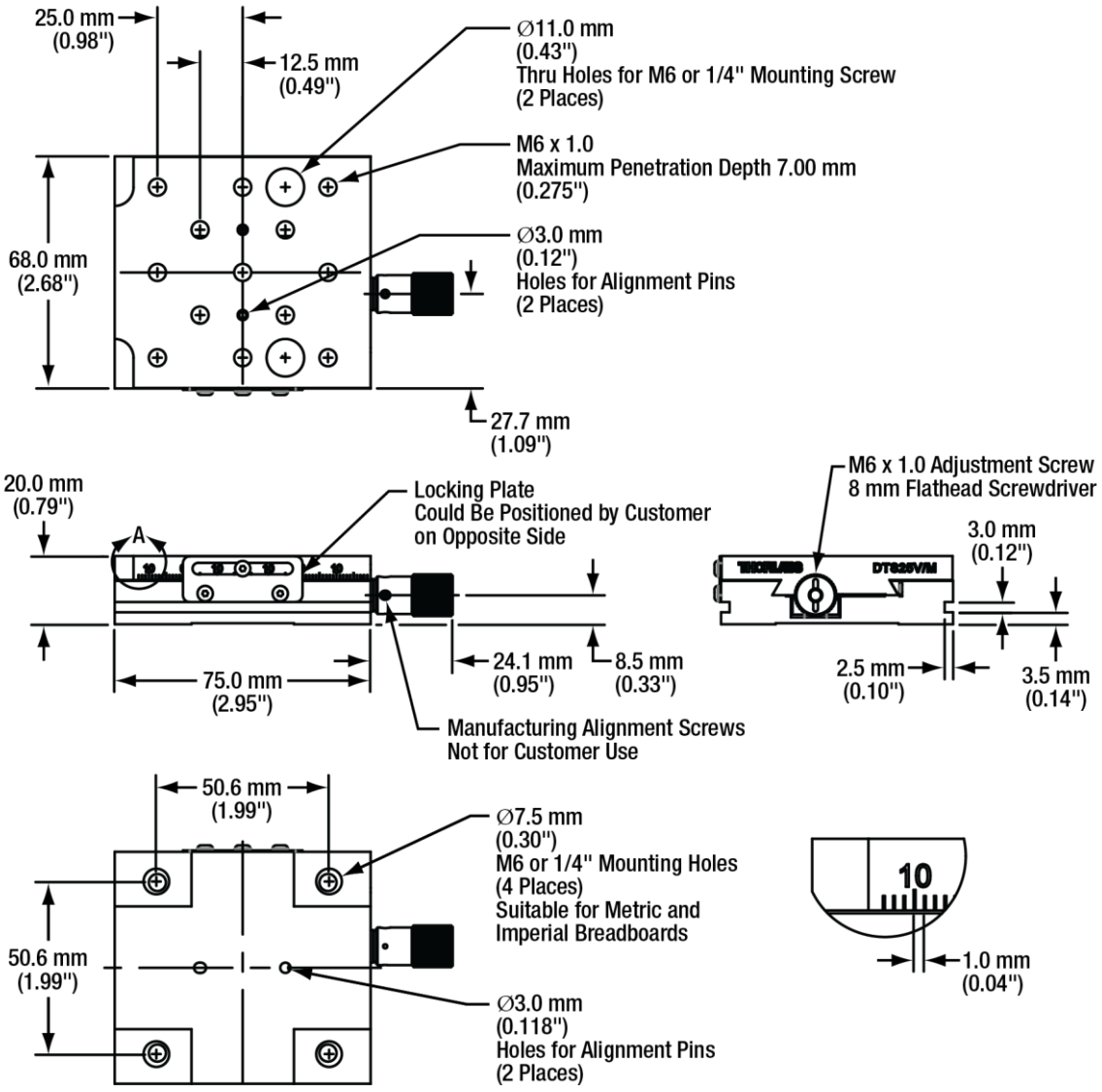


Figure 2 DTS25V/M Mechanical Drawing

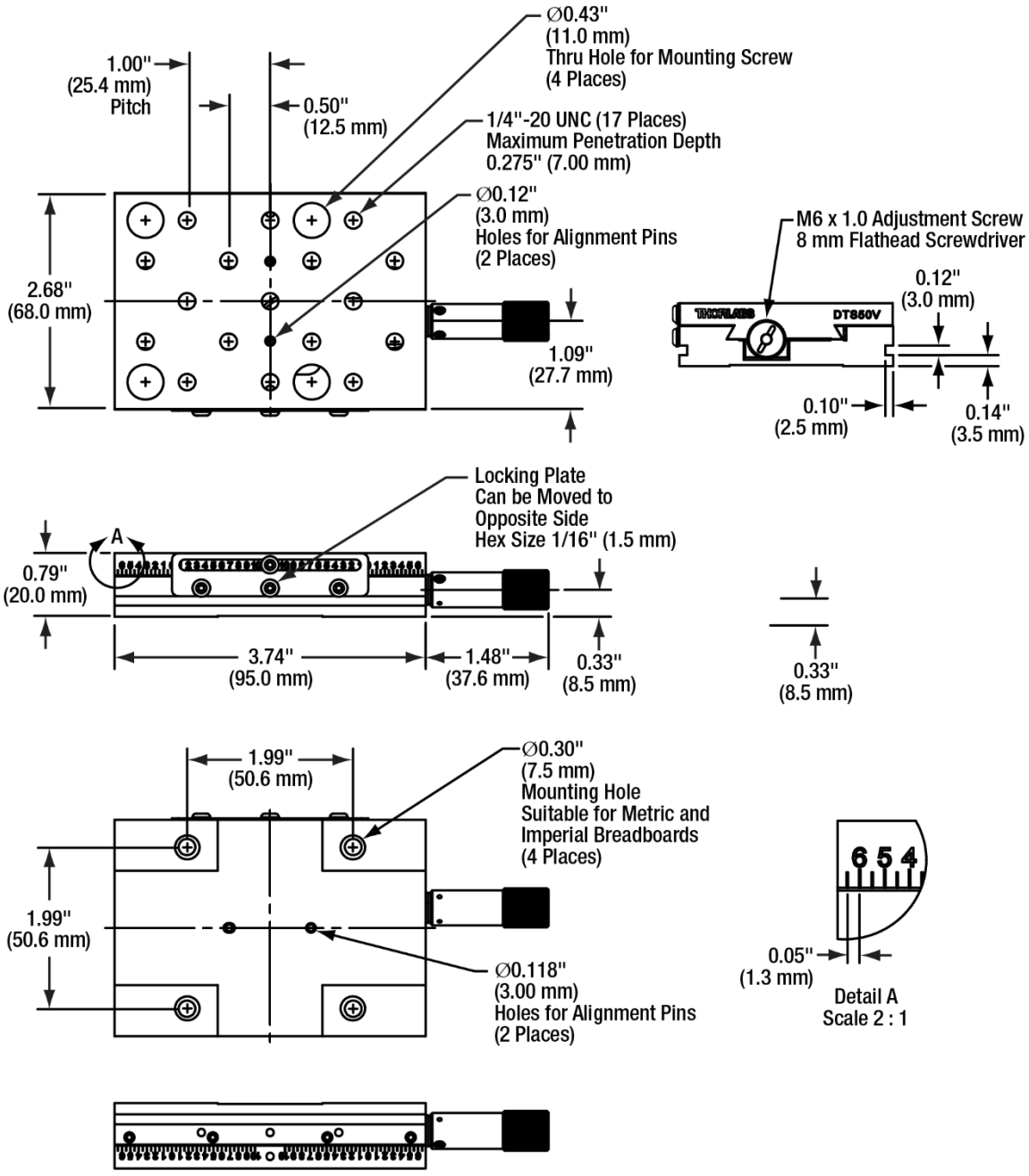


Figure 3 DTS50V Mechanical Drawing

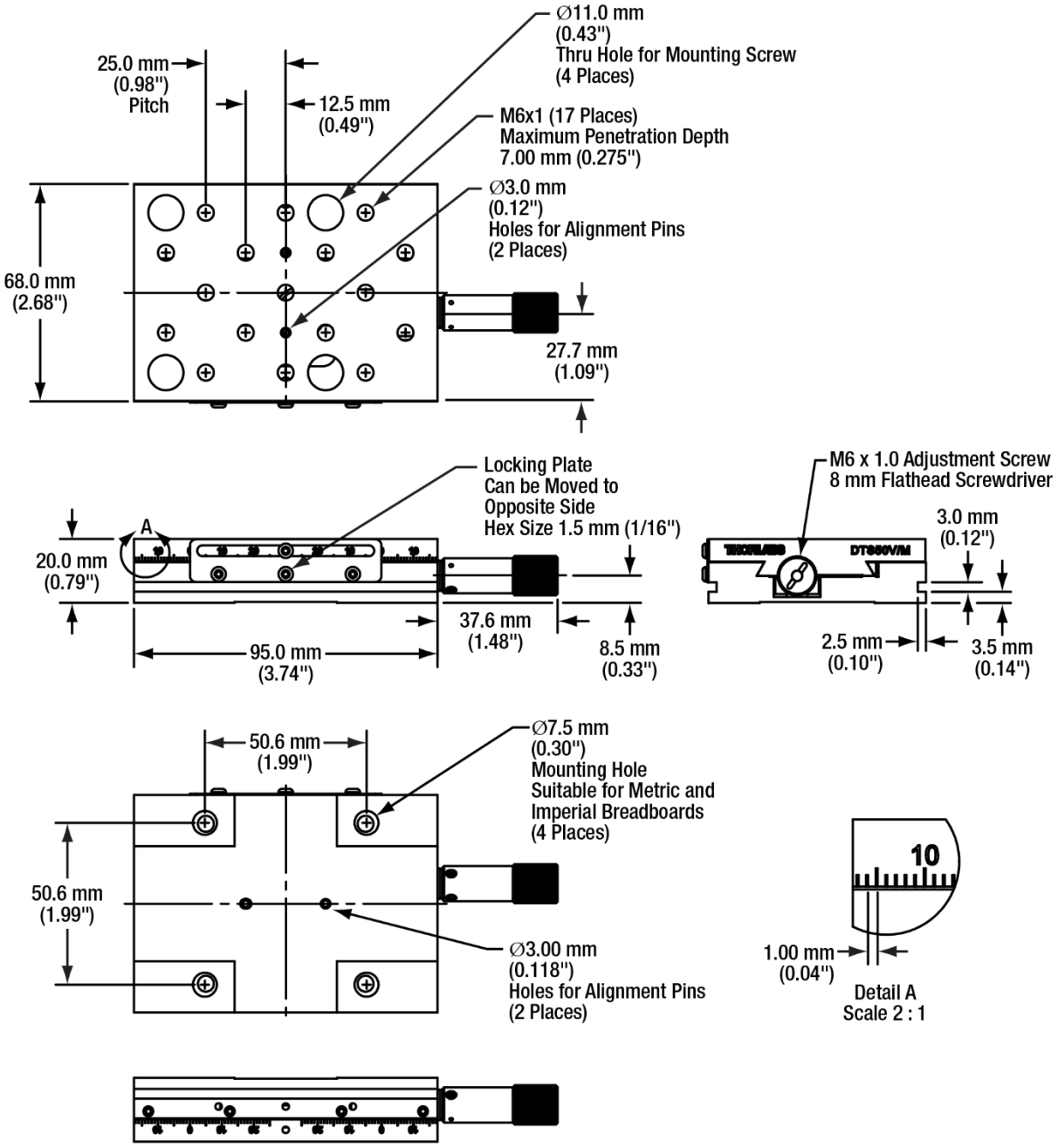


Figure 4 DTS50V/M Mechanical Drawing

Chapter 2 Safety Information

2.1 General Warnings

⚠CAUTION Risk of Trapping Fingers Between Parts

NOTICE

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

Excessive moisture may impair operation.

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

To ensure reliable operation, the unit should not be exposed to corrosive agents, excessive moisture, heat, or dust.

The unit is not designed to be used in explosive environments.

This equipment is for indoor use only.

Chapter 3 Installation

3.1 Environmental Conditions

Warning
The stages should be stored at 10 to 40 °C and <70% relative humidity. The stages should also be placed back into the bag they were packaged or a new bag to avoid unnecessary contamination.

3.2 Packing List

- DTS25V(/M) or DTS50V(/M) Imperial or Metric Stage
- Two Dowel Pins
- Manual Download Card

3.3 Unpacking

3.3.1 Unpacking and Handling

Follow the unpacking instructions below for safety.

1. During handling or shipping, the moving platform must be constrained with a locking plate to avoid damage to the dovetail.
2. Retain the packaging for future use.
3. The stage is cleaned and vacuum-packed before shipping. Unpack in a clean environment to prevent contamination.

4. HV or UHV baking of this stage may lead to contamination of the vacuum chamber due to metal vapour deposition or could compromise the mechanical integrity of the stage. A non-vacuum bakeout at 130 °C (266 °F) is recommended.
5. The stage is shipped with a plate fitted to the side, which locks the carriage during transit and in applications where accidental adjustment is undesirable. The top locking screw on this plate must be loosened before using the stage.

NOTICE

The stage should not be cleaned in an ultrasonic bath as it contains vacuum grease in the mechanism.

NOTICE

Avoid touching or moving the screws circled in red and blue as this can damage the stage. The blue circle shows one of two set screws on the adjuster knob that should not be touched.



3.4 Mounting

3.4.1 General

The DTS25V(/M) and DTS50V(/M) are vacuum-compatible dovetail translation stages that can be mounted directly to the work surface as shown in section 3.4.3. When mounting the stage close to other equipment, ensure that the travel of the moving platform is not obstructed.
The range of travel for the DTS25V(/M) and DT50V(/M) is 1" (25 mm) and 2"(50 mm) respectively, that is ±0.5" (±12.5 mm) or ±1" (±25 mm) about the nominal position.

NOTICE

Do not apply excessive pressure to the moving platform while mounting components or fitting a stage within an application as this can damage the bearing mechanism.

The DTS25V(/M) and DTS50V(/M) stages can be quickly assembled into XY, XZ, and XYZ configurations. The stages are supplied with dowel pins to ensure accurate and orthogonal assembly.

3.4.2 Locking Mechanism

The stages are shipped with a plate fitted to the side, which locks the carriage during transit, and in applications where accidental adjustment is undesirable. The screw securing the locking plate to the stage should be loosened before the stage is used as shown below.

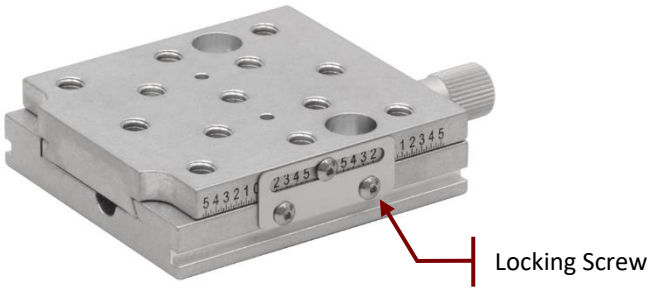


Figure 5 Locking Mechanism

3.4.3 Mounting Directly to the Work Surface

Refer to Figure 6 and proceed as follows:

1. Adjust the actuator to position the moving carriage such that the mounting holes in the base are clearly visible. Two holes should be visible through the holes in the top plate.
2. Fit four 1/4"-20 (M6 x 1.0 mm) socket cap screws (not included) through the mounting holes in the top platform and tighten to secure the stage to the work surface.

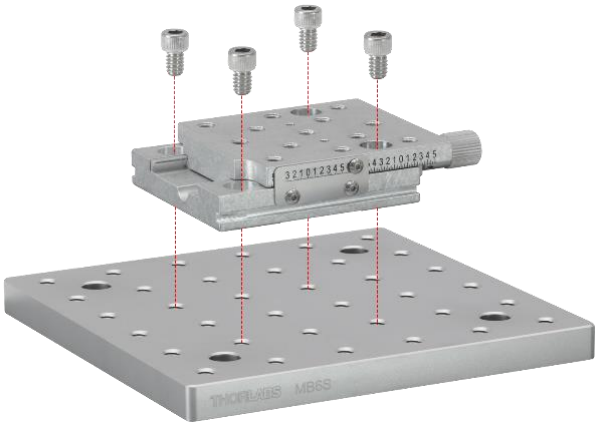


Figure 6 Mounting

3.4.4 XY Configuration

To create an XY configuration, first secure the X-axis stage to the work surface as detailed in Section 3.4.3. Then, refer to Figure 7 and proceed as follows:

1. Insert the supplied dowel pins into the dowel holes on the top plate of the lower stage.
2. Adjust the actuator to position the moving carriage of the upper stage such that the four mounting holes in the base are clearly visible through the holes in the top plate.
3. To ensure the stages are properly aligned, place the upper stage onto the lower stage such that the dowel pins of the lower stage fit into the dowel holes on the underside of the upper stage.
4. Insert four 1/4"-20 (M6 x 1.0 mm) socket cap screws 3/8" (10 mm) in length through the holes in the upper stage and tighten to secure the upper stage to the moving platform of the stage below. Please note the socket cap screws are not supplied with the stage.

NOTICE Use only bolts of the stated length. Longer bolts will protrude into the stage and damage the internal mechanism.



Figure 7 2-Axis XY Configuration of the DTS25V (Left) and DTS50V Stages (Right)

3.4.5 Adding a Vertical Axis

Assemble an X or XY configuration as detailed in Section 3.4.3 to Section 3.4.4. Then, refer to Figure 8 and proceed as follows.

1. Insert the supplied dowel pins into the dowel holes on the top plate of the lower stage assembly.
2. Fit the DTSA03V(/M) angle bracket onto the top plate of the lower stage assembly. Ensure that the dowel pins are inserted into the dowel pin holes on the bottom of the angle bracket.
3. Insert four 1/4"-20 (M6 x 1.0 mm) bolts 3/8" (10 mm) in length through the holes in the base of the angle bracket and tighten to secure the bracket to the lower stage assembly. Please note the bolts are not supplied with the stage.

NOTICE Use only bolts of the stated length. Longer bolts will protrude into the stage and damage the internal mechanism.

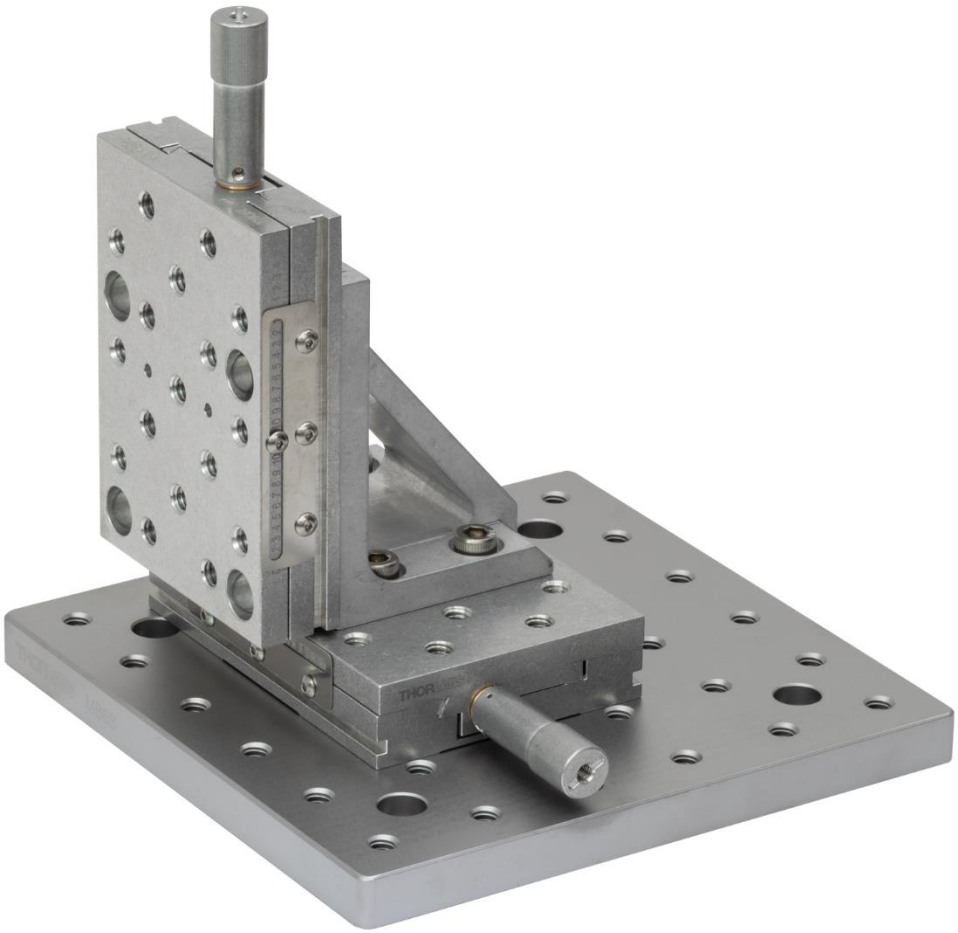


Figure 8 XZ Configuration Assembly

4. Insert the supplied dowel pins into the vertical mounting face of the angle bracket.
5. Adjust the actuator to position the moving carriage of the vertical stage such that the mounting holes in the base are clearly visible through the holes in the top plate.
6. Place the vertical-axis stage onto the vertical surface of the DTSA03V(/M) angle bracket such that the dowel pins fit into the dowel holes of the stage.
7. Insert four 1/4"-20 (M6 x 1.0 mm) bolts 3/8" (10 mm) in length through the holes in the upper stage and tighten to secure the stage to the angle bracket. Please note the bolts are not supplied with the stage.

3.4.6 Mounting Equipment to the Stage

NOTICE Equipment should be mounted with the stage at nominal position “0”.

The weight attached to the moving platform must not exceed 88 lbs (40 kg) if the stage is mounted horizontally, or 22 lbs (10 kg) if mounted vertically. Do not apply excessive forces to the moving platform.

The top platform of the stage features an array of 1/4"-20 (M6 x 1.0 mm) mounting holes for fitting accessories such as fiber clamps, mirror mounts, or other compatible components.

Chapter 4 Operation

To move the top platform forwards/backwards on both stages, turn the adjuster clockwise/counterclockwise. The lead screw has a 1.0 mm pitch which means that the top platform will move 0.04" (1.0 mm) per revolution of the adjuster. An 8 mm flathead screwdriver can also be used to rotate the knob.
A graduated scale is engraved onto two, opposite sides of the moving platform. The DTS25V stage has graduations of 1/40" while the DTS50V has graduations of 1/20". Both metric versions have graduations of 1.0 mm.

Chapter 5 Transportation

When packing the unit for shipping, use the original packing. If this is not available, use a strong box and surround the unit with at least 100 mm of shock absorbent material.

Before the stage is packed for transit, adjust the actuators to the center of travel and then tighten the locking mechanism.

Chapter 6 Thorlabs Worldwide Contacts

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