Vibration Isolation Systems for Optical Tabletops

Vibration isolation systems are used to maintain stability in the environment around an optical table so that there is minimal contribution from ground-borne vibrations to the relative motion of the table itself or between components mounted to the optical table. Vibrations may result from seismic activity from the building, pedestrian traffic, or nearby machinery. The amount of transmitted vibration transferred to the tabletop represents an important factor in defining an optimized setup.

Thorlabs offers three levels of optical table supports: rigid, passive, and active. All three varieties of table supports are available from stock in two heights: 600 mm (24") for use with a 310 mm (12.2") thick optical table and 700 mm (28") for use with a 210 mm (8.3") thick optical table. Special optical table support heights are available upon request.

Before choosing an isolation system, consider the severity of the environment in which the table is located and what type of vibrations can be expected. Visit www.thorlabs.com to find our Optical Tables Tutorial, which provides extensive information on the types of vibration isolation, sources of vibration, and tabletop design. This information should serve as a good guide for choosing between a rigid, passive, and active system. Alternatively, one of our application engineers can help select the correct isolation system.

Selecting a Vibration Isolation System

TYPICAL APPLICATIONS	NOISE	RIGID SUPPORT	PASSIVE SUPPORT	ACTIVE SUPPORT
Demanding Applications • Nanopositioning • Submicron Precision • Phase Related • Interferometry • Holography • Single Mode Fiber Alignment	Quiet		❑	■
	Typical			■
	Noisy			■
General Photonics • Bioimaging • Raman Spectroscopy • Micropositioning • Micromachining • Non-Interferometric • Laser Chemistry • Single Mode Fiber Alignment	Quiet		■	
	Typical		❑	■
	Noisy			■
Less Demanding Applications • Pulse Laser • General Spectroscopy • Velocimetry • Multimode Fiber Alignment	Quiet	■		
	Typical	❑	■	
	Noisy		❑	■

■ Recommended ❑ Suitable

Isolator System Performance Comparison

PARAMETER	RIGID NON-ISOLATING SUPPORTS (See Page 65)	PASSIVE VIBRATION ISOLATORS		ACTIVE, SELF-LEVELING VIBRATION ISOLATORS (See Pages 67 - 68)	
		STANDARD DUTY (See Page 66)	HEAVY DUTY (See Page 66)		
		Vertical	Vertical	Vertical	Horizontal
Resonant Frequency	Non-Isolating	4.5 Hz	4.5 Hz	1.25 Hz	1.0 Hz
Transmissibility (at Resonance)	Non-Isolating	22 dB	22 dB	10 dB	12 dB
Transmissibility @ 10 Hz (Isolation Efficiency)	Non-Isolating	-11.5 dB (74%)	-11.5 dB (74%)	-32.5 dB (97.5%)	-30 dB
Load Capacity (Set of 4)	5500 lbs (2500 kg)	2425 lbs (1100 kg)	4850 lbs (2200 kg)	5500 lbs (2500 kg)	

Optical Table Support Systems

Rigid Non-Isolating Supports

See Page 65

Passive Vibration Isolators

See Page 66

Active Vibration Isolators

See Pages 67 - 68

Vibration isolators prevent environmental motions and vibrations from disturbing components mounted on an optical table or breadboard. The best isolator for an application depends on the sensitivity of the experiment, tabletop weight, and the environmental vibrational noise.

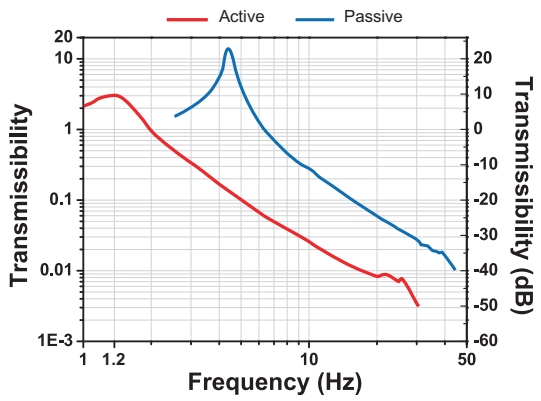
We recommend that you consider both immediate and future needs when choosing an isolator system. The transmissibility vs. driving force frequency plot to the right should help you to select an optical table system that will suit your application and working environment. Most large-amplitude vibrations found in a lab occur at frequencies between 10 and 100 Hz.

When choosing between a passive and active isolation system for an optical table, you typically want the resonant frequency (i.e., the frequency at which the transmissibility curve peaks) to be as low as necessary to compensate for the vibrations present in the laboratory and to provide the isolation needed given the sensitivity of the experiment itself. At low frequencies, the transmissibility is close to one, which indicates that the tabletop and pneumonic supports are oscillating with the same amplitude.

As the frequency of the driving force increases, the tabletop's momentum prevents it from moving in phase with the driving force (i.e., a change in the direction of the driving force does not instantly result in a change in the direction the tabletop is moving). When the phase lag between the driving force and the vibration of the table becomes exactly 90°, the system is vibrating at its natural (resonant) frequency. Referring to the graph below, it can be seen that the resonant frequency of an active table is lower than that of a passive table. Specific isolator performance specifications are provided on the following pages.

If you should need further assistance, please contact your local Tech Support office.

Isolator System Comparison



The PTR12109 optical tabletop is shown with the PTS603 self-leveling isolation system, which is shown on pages 67 - 68.

Rigid, Non-Isolating Systems

PTL602

PTL603

Specifications

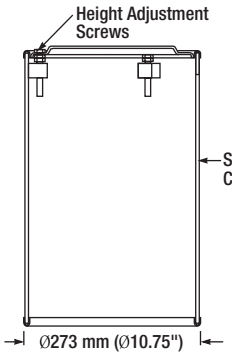
- **Maximum Load Capacity (Set of Four):** 5500 lbs (2500 kg)
- **Height:** 23.6" (600 mm) or 27.5" (700 mm)
- **Height Adjustment:** +0.6", -0.16" (+15 mm, -4 mm)
- **Finish:** Black Paint
- **Weight (Mass) PTL602:** 123 lbs (56 kg), Set of Four
- **Weight (Mass) PTL603:** 141 lbs (64 kg), Set of Four

Many environments and applications do not warrant vibration isolation. In such cases, it is only necessary to have a non-isolating support structure. Thorlabs' rigid isolation systems are economical support structures that are strong enough to support an optical table under heavy load.

Thorlabs offers non-isolating supports designed to support optical tables without cumbersome tie bars. Each non-isolating support has three adjustment screws to level or provide 0.85" (21 mm) of table height adjustment using an open-end wrench.

The set of four non-isolating supports have a total load capacity of 5500 lbs (2500 kg). They are available in two standard heights, 23.5" (600 mm) or 27.5" (700 mm), to allow any table surface to be supported at a standard 36" (910 mm) height. Special heights are available upon request.

Rigid Non-Isolating Support



Manual Leveling Adjustment on Each Support to Compensate for Uneven Floors

Rigid, Non-Isolating Supports

ITEM #	$	£	€	RMB	DESCRIPTION	HEIGHT
PTL602	$ 1,120.00	£ 806.40	€ 862,40	¥ 8,926.40	Rigid Support, Set of 4	23.5" (600 mm)
PTL603	$ 1,120.00	£ 806.40	€ 862,40	¥ 8,926.40	Rigid Support, Set of 4	27.5" (700 mm)