

TUNED MASS DAMPER (TMD) M-SERIES RESONANT DEVICE



Moog's advanced Magnetic-Series resonant devices are the perfect solution for structural resonance suppression and vibration control applications, and they are especially suited for precision micro-vibration applications. By replacing traditional elastomeric and fluidic damping technology with highly reliable rare earth magnetics, improved temperature range performance and a field-tunable damper coefficient has been achieved. The M-Series

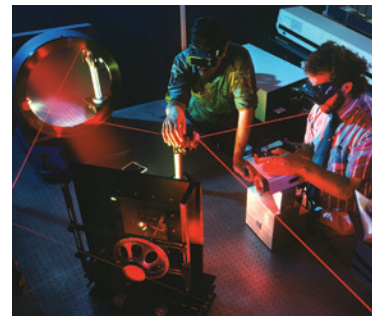
also facilitates rapid natural frequency adjustment, allowing the end-user to easily modify the device's resonant frequency response.

FEATURES

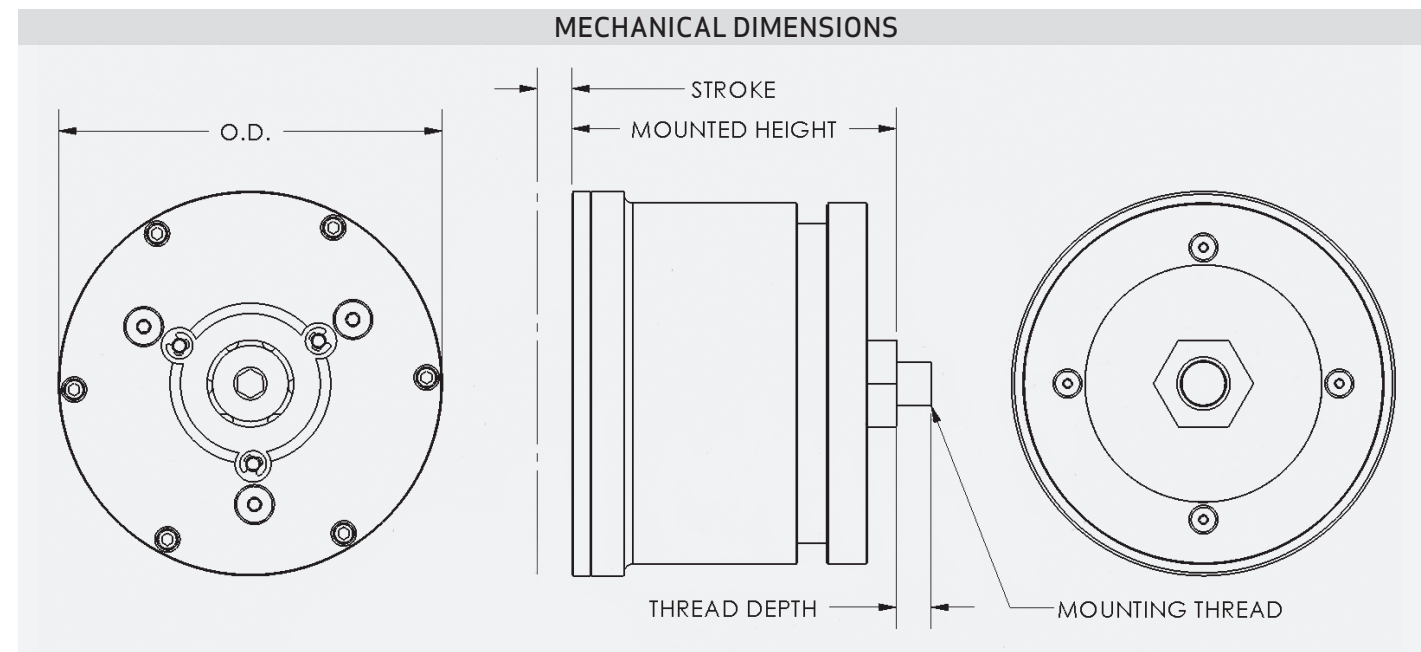
- Highly efficient moving mass to parasitic mass ratio
- Tunable resonant frequency via mechanical adjustment
- Tunable damping ratio via a trimmer on devices
- Convertible to an active reaction mass actuator (RMA) which can be useful for:
 - Structural dynamics testing with minimal mass loading
 - Active vibration damping or cancellation systems

APPLICATIONS

- Precision micro-vibration
- Optical instruments
- Machine tools
- Product testing
- Semiconductor fabrication equipment
- Electron microscopes
- Directed energy systems



TUNED MASS DAMPER M-SERIES RESONANT DEVICE



HARDWARE SPECIFICATIONS

Specification	Units	M05	M1	M2
Moving Effective Weight	Lbs (Kg)	0.50 (0.23)	1.05 (0.48)	2.10 (0.95)
Total Device Weight	Lbs (Kg)	0.62 (0.28)	1.37 (0.62)	2.55 (1.16)
Construction	-	Primarily constructed of various metals. Treated to enhance durability and corrosion resistance.		
Operating Temperature ¹		Up to 80° C (176° F)		

MECHANICAL DIMENSIONS (SEE ICD FOR FURTHER DETAILS)

Specification	Units	M05	M1	M2
O.D.	Inch (mm)	1.99 (48.3)	2.69 (68.3)	3.32 (84.3)
Stroke ± ²	Inch (mm)	0.09 (2.3)	0.13 (3.3)	0.19 (4.8)
Mounted Height	Inch (mm)	1.73 (43.9)	2.15 (54.6)	2.81 (71.4)
Thread Depth	Inch (mm)	0.22 (5.6)	0.35 (8.9)	0.30 (7.6)
Mounting Thread	-	#10-32	1/4"-20	3/8"-16

ELECTRICAL SPECIFICATIONS (RMA USE)

Specification	Units	M05	M1	M2
Coil Resistance	ohms	5.6	6.0	7.2
Coil Inductance	mH	0.7	1.3	1.7

¹Wider temperature range versions available upon request.

²Stroke represents the maximum allowable mechanical stroke designed into the unit. Operating at high frequency and/or high vibration magnitudes can cause over stress of internal elements and may result in damage to the device. Consult with Moog for detailed information about stroke limitations.

Alternate mounting considerations are available upon request.

M-SERIES RESONANT DEVICE CONFIGURATIONS

Configuration	Application	Description
Tunable Voice Coil Damper	TMD/TVA	The most popular and versatile configuration is an M-series device equipped with a tunable voice coil damper. Applications requiring a TMD or TVA (tuned vibration absorber) will benefit from the tunability of both frequency and damping of this passive device.
Active Voice Coil	RMA	This configuration can generally achieve the highest levels of vibration attenuation and give the user power to implement active damping.
Fixed Damper	TMD/TVA	This configuration can provide the highest damping levels and is well suited for high frequency applications which require large amounts of energy dissipation from a passive solution.

The M-series resonant devices are available in the above 3 basic configurations in addition to custom offerings. All configurations are available in three different device sizes (M05,M1,M2) with a variety of frequency tuning ranges.

PERFORMANCE SPECIFICATIONS

	Units	M05	M1	M2
Frequency: Operational Range ³	Hz	9-200		
Frequency: Tunable Range ⁴		Multiple tuning ranges available. 1X:2.5X Hz ranges		
Damping: Tunable Range ⁴	%Zeta	See "FREQUENCY VS DAMPING RATIO"		
Damping: Max (no adjust)	%Zeta	See "FREQUENCY VS DAMPING RATIO"		
Damping Temperature Dependence		Approximately 0.4% damping constant per degree C. Damping decreases as temperature rises. Further temperature sensitivity may be observed at temperature extremes.		

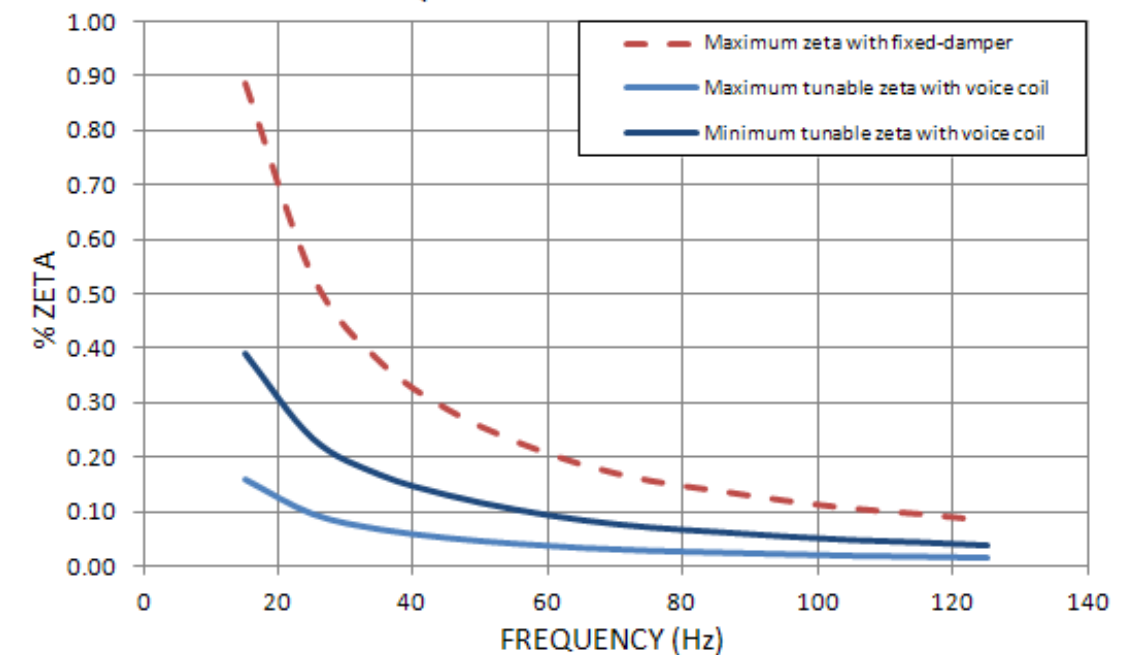
PERFORMANCE AS A REACTION MASS ACTUATOR

Specification	Units	M05	M1	M2
Force Constant	lbf/amp (N/amp)	1.7 (7.6)	2.9 (12.9)	4.6 (20.5)

³Operational range may vary per application, environment and damping requirements. Consult Moog for further information.

⁴Consult Moog drawing # MTMD-900 for natural frequency and damper tuning procedure details.

FREQUENCY VS DAMPING RATIO



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