



## HFe 3 High-Frequency Dynamic Stiffness Test Rig for Elastomer Mounts

Electric and fuel cell vehicle drives present NVH specialists with new and challenging design requirements. Noises previously masked by the combustion engine are audible and more intrusive in electric vehicles. Elastomeric anti-vibration mounts influence the NVH properties of the whole vehicle. They help to enhance driving comfort and minimize noise. The HFe 3 test rig expands the dynamic testing boundaries of these elastomer mounts. Measuring the dynamic stiffness of elastomer components in higher frequencies up to 3,000 Hz becomes increasingly important when designing the acoustic characteristics of vehicles. Anti-vibration components such as engine mounts, chassis mounts, suspension bushes and vibration absorbers can be characterized with m+p international's HFe 3 high-frequency test rig.

The state-of-the-art test rig technology will help you shorten development cycles by validating your simulation results on the component level, leading to fewer prototype loops and improved simulation models.

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# HFe 3

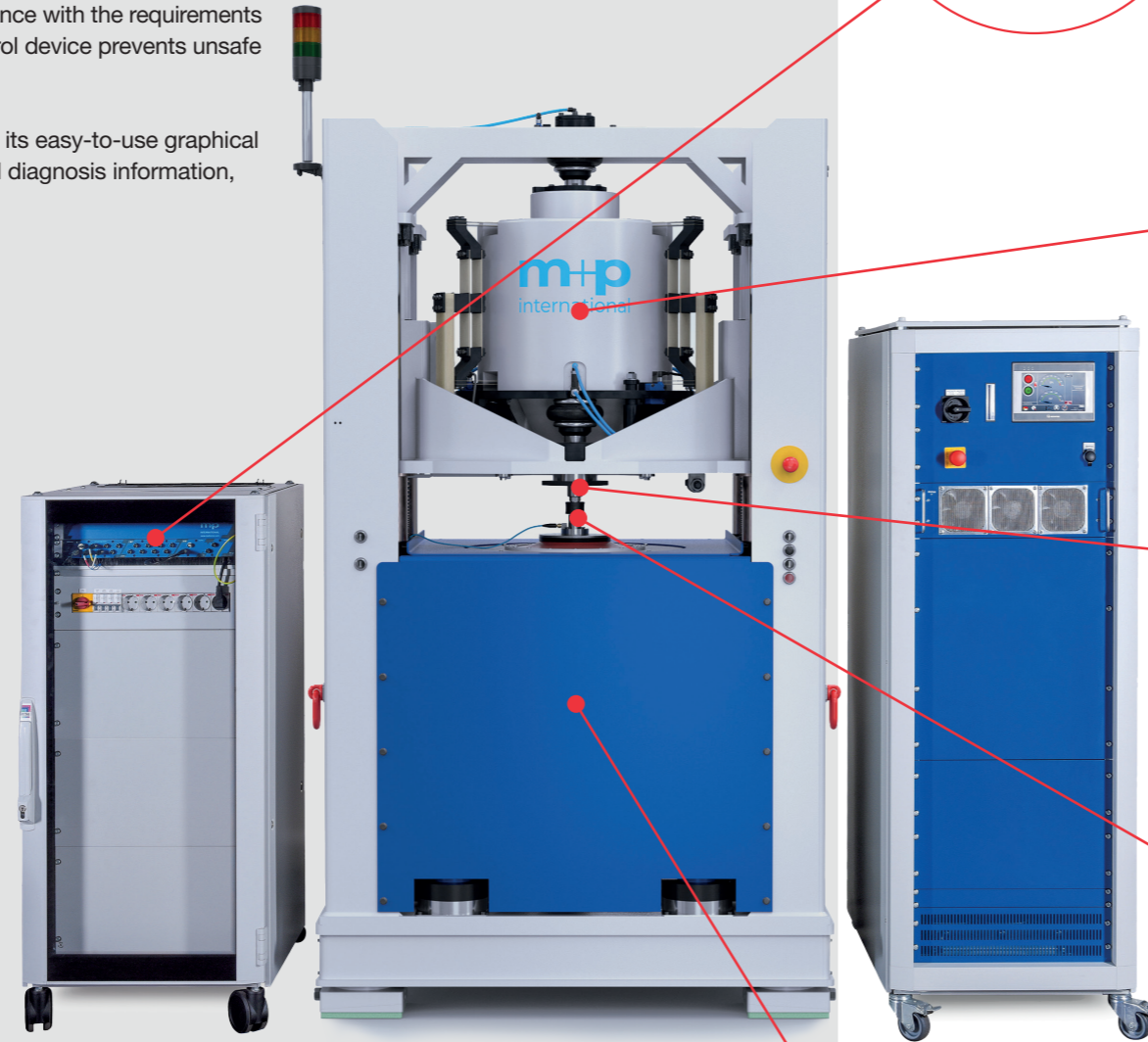
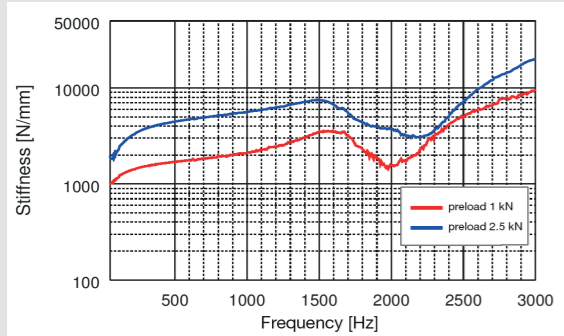
## High-Frequency Dynamic Stiffness Test Rig for Elastomer Mounts

### Safe and Easy Operation

The HFe 3 test rig has been designed and built in compliance with the requirements of EU Machinery Directive 2006/42/EC. A two-hand control device prevents unsafe operation of the traverse during specimen installation.

The built-in industry grade automation PLC platform with its easy-to-use graphical user interface displays the state of the rig and its detailed diagnosis information, allowing all key data to be visible at a glance.

### Dynamic Stiffness



### Test Control and Analysis System – Versatile and Proven

m+p VibControl, the best-in-class vibration controller, is at the core of the test rig. It offers a wide range of measurement, analysis and reporting features which can be configured and updated according to your needs. The m+p VibControl software logs the accelerations below and the dynamic forces above the specimen. The dynamic transfer stiffness and loss factor are calculated and displayed during the measurement. All measured data and results are stored in the frequency domain with amplitude and phase information.



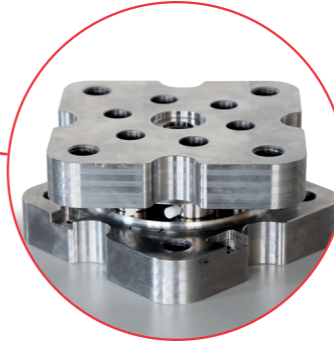
### Reliable Vibration Isolation / Static Preload

Vibration isolation is key to a good measurement result. The shaker and seismic mass are supported by pneumatic springs with a low stiffness, isolating the specimen from surrounding vibrations above 20 Hz. Thus, only the desired and carefully controlled dynamic loads that are applied to the specimen will be measured. The specimen is supported against a seismic mass allowing the application of axial preload. The PLC allows for automatic application of the preload which increases reproducibility, minimizing errors and simplifying operator training.



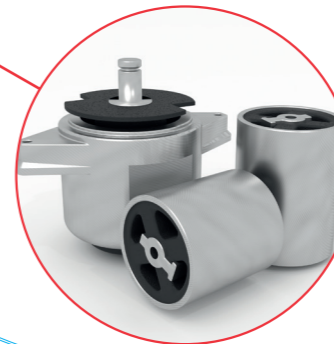
### Dynamic Force

The dynamic force is measured between the test specimen and the seismic mass, i.e. the output force of the test specimen is measured. To ensure resonance-free measurements, the force sensor was carefully designed using Swiss-made, high-precision piezoelectric load cells.



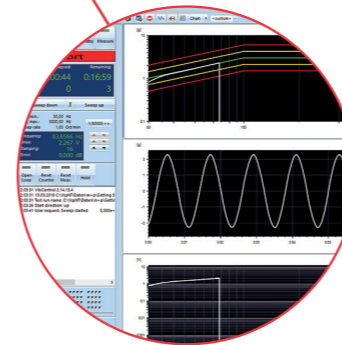
### Test Specimen

A wide range of different engine mounts, chassis mounts, suspension bushes, vibration absorbers and other anti-vibration components can be characterized with the m+p high-frequency test rig. Due to this multitude of test specimens with varying geometry and stiffnesses, a suitable test fixture adapts each specimen to the shaker and the force sensor.



### Dynamic Load

The fixture-mounted specimen is attached to the armature of an electro-dynamic exciter (shaker). The shaker, made in Germany, is specifically designed for the application and allows for the compensation of the static preload. It automatically offsets the static deflection of the moving element to keep the armature centered. During testing the specimen is stressed at a predefined static preload superimposed on dynamic acceleration levels up to 90 g.



- High-frequency testing of elastomeric anti-vibration mounts in the automotive industry
- Testing the dynamic stiffness from 50 to 3,000 Hz
- Test specimen from 250 to 50,000 N/mm
- Preload up to 8,000 N
- Closed-loop load control

# Services that Add Value

m+p international complements its cutting-edge HFe 3 high-frequency test rig with a variety of pre- and after-sales services from skilled engineers. Our services to ensure your testing success, optimal investment protection and long lifecycle of the equipment include:

## Pre-sales Services

- See the high-frequency test rig and other m+p solutions in action at our Customer Experience Center in Hannover, Germany.
- Attend a remote demonstration.
- Test service: Allow us to run small-batch tests of your anti-vibration mounts for validation with your existing measurement results.



## After-sales Services

- Global network of experts ensures fast remote and on-site support.
- Regular calibration of measurement hardware and sensors.
- Upgrades: PLC maximizes repeatability of measurements. Support of different test modes, e.g. random, sine, sweeps and road load simulation.



# About m+p international

m+p international has been developing and producing high-quality measurement and test systems at its headquarters in Hannover since 1980. We are active in four business areas: vibration testing, noise and vibration analysis, data and process monitoring and test rig technology. Our state-of-the-art products meet the highest standards of quality and reliability and are used in numerous key industries worldwide. m+p international has subsidiaries in the USA, England, France and China along with representatives in around 30 countries.



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