High Frequency Elastomer Testing Systems

For the determination of the mechanical properties of visco-elastic materials and components in a frequency range up to 500Hz

Applications
- Dynamic testing of elastomer materials and components
- Determination of loss angle, dynamic stiffness, loss work and much more
- Static testing with multi window stiffness evaluation
- Free oscillation resonance test
- Durability testing
Inova Testing Systems

Benefits
Inova Servohydraulic Testing Systems is a specialist in the field of high frequency elastomer testing.
Experience with testing systems up to 1000Hz and retrofits of different third party systems, together with our electronics/software solutions are the reasons for high reputation of Inova in this application segment.
High performance combined with reliability, user friendly operation and our experience gives the most benefit to our customers.

Concept
Inova elastomer testing systems consist of a specially designed extreme stiff loading frame with crosshead integrated hydostatic actuator, special high performance digital control electronics and a wide range of software modules to run the test.
The whole system concept, the resonance free loading frame, the unique measuring system in combination with the software gives unbeaten accuracy in the results.

Loading Unit
The loading unit mechanical design is the result of using state of the art technologies like FEM optimisation, and modal analysis in combination with 40 Years of experience in the design of dynamic testing systems.

Measuring Systems
High frequency elastomer testing requires special measuring systems. The total load to the specimen is composed of a static portion measured by pressure transducer in the actuator chambers and a dynamic part measured by a Piezoo electric load cell.
Displacement is measured by an actuator integrated LVDT and an accelerometer at the piston rod.
Load cell signals are compensated by accelerometers to avoid vibration effects to measurements.

The key to exact loss angle measurement is that the system knows the exact phase shift of each measuring chain. These phase shifts are measured by a special calibration procedure with a zero loss angle and exact known stiffness calibration specimen.
The calibration curves measured this way are used to evaluate the compensation for the different phase behaviour of the different sensors.

Controlling
The piston movement prime control is from a digital PID-F controller. For elastomer testing, precise mean and peak control are necessary. For this, Inova digital real-time multi mode peak control is the answer. This controller is able to switch seamlessly between LVDT and acceleration peak control at a certain defined frequency. The mean control can be set to load or displacement. The peak and mean values are also realised by PID controllers. All parameters can be tuned by the user to enable the system to reach the desired values in a minimum time to avoid heating up of the specimen.

Software
Our software for elastomer testing was developed together with the leading companies in the European automotive industry. The result was an easy to use, user friendly software package that meets all requirements of modern state of the art elastomer testing.
The software calculates all relevant characteristics from elastomer components such as loss angle, dynamic stiffness, loss work and much more.
The software allows to combination of different tests e.g. the static test with one or more dynamic test with different parameters as a batch. This batch runs without interaction with the user.
The results are displayed as a graph versus testing frequency or as a table. Results can be printed in a customer defined protocol layout or exported as an excel compatible ASCII file.

Accessories
For the Inova elastomer testing system a wide range of accessories is available:
- Crosshead control module
- Side load unit with hydostatic bearing slip table for side load application and multi axis characterisation
- Hydraulic supply
- Protective safety enclosures
- Optimized specimen fixtures
- Temperature chambers
- Additional actuators e.g. rotary
- Additional high resolution displacement Sensor for precise static test

Customized Solutions
Beneath our standard solutions for elastomer testing we are able to customize the system to your special demands like database connections for the results or integration of such systems in your manufacturing lines. Please speak to our specialists.
Software LabExpert-Elastomer

Our Software Package LabExpert-Elastomer allows the set-up of complex test sequences with a few mouse clicks. Test procedures are stored on the hard disk for later use.

The different testing modules e.g. static tests, dynamic tests and protocol generation can be composed into batches which can be run automatically after clicking the start button.

The intuitive user interface of the software even allows inexperienced users to run the tests.

![Graphical wizards to set-up the tests.](image)

**Interrupt Segment**

- Frequency: 1.0 kHz
- Mean: 100 cycles
- Recycles: 20

- Amplitude (x): 0.95 mm
- Preload (z): 100 N

![Graphical wizards to set-up the tests.](image)

**Easy set up of a dynamic block sweep test with 5 different preloads in one simple window**

![Graphical wizards to set-up the tests.](image)

**Composing test modules into batches**

- Customized protocol of a dynamic test with loss angle and dynamic stiffness as function of the testing frequency, measured with different amplitudes.

- Evaluation protocol of a static test

- PID Loop optimisation tool

- Display of single Hysteresis
## Specifications

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<th>Type</th>
<th>Unit</th>
<th>FU500-16</th>
<th>FU500-25</th>
</tr>
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<tbody>
<tr>
<td>Nom. Load</td>
<td>[kN]</td>
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<tr>
<td>Stroke</td>
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<td>50</td>
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<td>Servo valves</td>
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<td>1x Moog 19L/min High Response</td>
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