



限りある資源と美しい自然を大切に

# MODEL VR-7130 FULLY AUTOMATIC VISCOELASTICITY ANALYZER



UESHIMA SEISAKUSHO CO., LTD.



**Fully Automatic Viscoelasticity Analyzer MODEL VR-7130  
Combined with Thermo Jetter**

## Outline

Viscoelastic materials such as polymer materials have a time lag before deformation (response) to the applied force (input). The relationship between this input and response depends on the composition of the material and is also dependent on temperature, velocity and deformation. Polymer materials are used in various applications and fields by taking advantage of these properties. Viscoelastic analyzers are an indispensable tool for material development because they measure these properties. The VR-7130 is a viscoelastic analyzer that eliminates human errors and difference between operators, thoroughly pursuing accuracy and efficiency.

## Applications

- Simulation of product property by test pieces

Tire: Abrasion/Friction/Rolling Resistance/  
Evolution of heat etc.

Car: Ride/Vibration-proof performance/noise

Other Vibration control and/or suppression/

Sealing ability.....

- Molecular structure/degradation level etc.

## Measurement items

- Absolute complex modulus  $|E^*|$  :  $10^{-1}$  -  $10^4$ MPa
- Storage modulus  $E'$  :  $10^{-1}$  -  $10^4$ MPa
- Loss Modulus  $E''$  :  $10^{-1}$  -  $10^4$ MPa
- Tangent delta  $\tan\delta$  : 0.001 - 3.000

## Features

- Maximized benefits of fully automated testing  
It realizes a significant improvement in test efficiency. By fully automating the chucking, measurement, and ejection of the test piece, 100 test samples can be tested without touching the equipment. Use of spring type chucks eliminates the need to retighten the sample at low temperatures.
- No liquid nitrogen  
Test can be performed down to  $-100^\circ\text{C}$  in combination with THERMO JETTER without using liquid nitrogen, realizing unmanned low temperature tests.
- Sample temperature measurement accuracy  
The difference between the actual sample temperature and the measured temperature has been minimized by the stepwise temperature control and the unique temperature sensor embedded in a rubber piece of the same thickness as the test sample.
- Accuracy of load and displacement measurements  
In the measurement of viscoelasticity, minute deformations such as several  $\mu\text{m}$  to several tens of  $\mu\text{m}$  are measured, so the rigidity (deflection) of each component affects the test results. The VR-7130 uses a highly rigid piezoelectric load cell and a non-contact micro-displacement meter with a resolution of  $0.3 \mu\text{m}$ , achieving high-precision measurement.
- Eliminates the effects of resonance  
The compact design eliminates resonance in the test frequency range, securing measurement accuracy. (Excluding the natural vibration of the sample)
- Direct calculation of phase for accurate  $\tan\delta$
- Master curve available as an option



**Fully Automatic chuck of VR-7130**

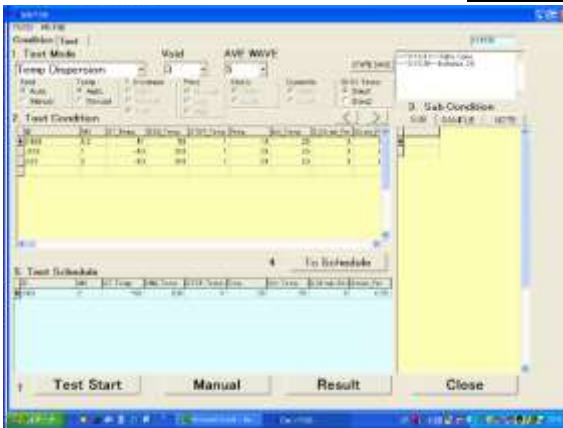
# Software

## Database software



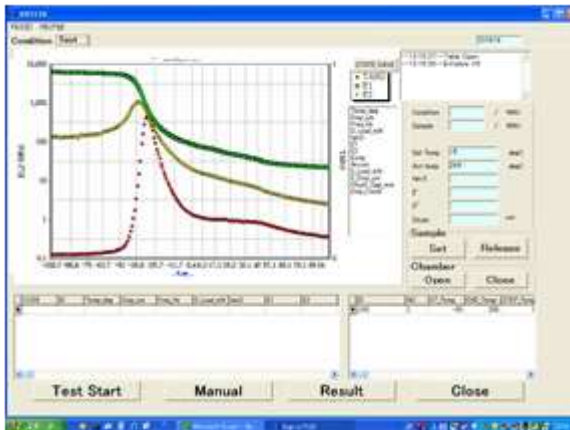
- Management of testing conditions
- Management of testing results
- Management of equipment conditions
- Data backup

## Measurement software



### Test Condition Input Screen

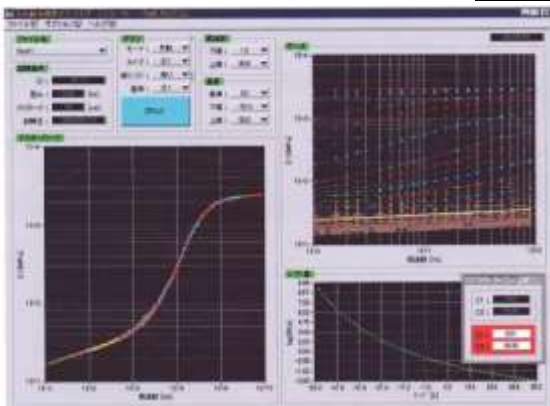
- Choice of testing mode :  
Fixed point measurement, Temperature dispersion, Frequency dispersion, Strain dispersion etc.
- Setup of testing conditions :  
Testing temperature, frequency and strain
- Sample conditions : Thickness, Breadth



### Testing Screen

- Real time indications among testing (Graph and value display)
- Present conditions are available by status display. Error handling is easy also
- Reporting output and text conversion (CSV form) after testing are possible

## Master curve software



Viscoelasticity at high-frequency, under impossible conditions for actual testing, can be estimated by experimental formula

- Low temperature property ⇒ High-frequency property
- High temperature property ⇒ Low-frequency property

## Specifications

Name	Fully Automatic Viscoelasticity Analyzer
Model	VR-7130
Sample dimensions	Rectangular shape 40(L) x 4(W) x 2(t) mm
Testing method	Vertical tensile method
Chucking method	Constant pressure tightening by spring structure
Sample convey system	Automatic: 100 samples max.
Distance between chucks	20mm (Option: 10mm)
Load detection	(1) Load detector: Piezoelectric type load cell (Choose rating: $\pm 45\text{N}$ or $\pm 450\text{N}$ ) (2) Maximum load: 200N (with Load cell $\pm 450\text{N}$ ) (3) Resolution: 1% F.S.
Displacement detection	(1) Displacement sensor: Optical fiber, non-contact type small displacement sensor (2) Maximum displacement: 1,000 $\mu\text{m}$ (3) Resolution: 0.3 $\mu\text{m}$
Vibrator	(1) Vibration system: Electric vibrator (Lower chuck drive) (2) Vibration waveform: Sinusoidal wave (3) Vibration frequency: 0.1 to 200Hz continuously variable (4) Vibration amplitude (strain): $\pm 0.1$ to $\pm 2.5\%$ (40 to 1,000 $\mu\text{m}$ p-p) continuously variable ( $\pm 0.2$ to $\pm 5\%$ in case of 10-mm chuck distance)
Initial tension	(1) Mechanism: Lower side chuck tension by the vibrator (2) Method: Constant strain method, constant load method (calculated to strain) (3) Tension: 0 $\mu\text{m}$ to 2,000 $\mu\text{m}$
Thermostatic chamber	Framework: Opens and closes automatically
Testing temperature range	-90 to 200°C (optionally down to -100°C without using liquid nitrogen)
Safety device	(1) Emergency stop switch (2) Overheat limiter (3) Pneumatic limiter (4) Ground-fault circuit breaker
Connection for control	(1) Main unit control: USB (2) Temperature control: RS-232C (D-SUB 9pin)
Utilities	(1) Main unit : Power source AC100V 1-phase 2kVA Dry air 0.4MPa (2) Thermo Jetter : Power source AC200V 3-phase 4kVA Dry air 0.5MPa Flow rate 250L/min (under atmospheric pressure)
Usage environment	(1) Temperature : 5 to 40°C (2) Humidity : 35 to 80%RH
Dimensions	Main unit and the rack: approx. 470 (W) x 470 (D) x 1320 (H) mm Thermo Jetter (cooling air generator): approx. 510 (W) x 740 (D) x 1110 (H) mm
Accessories	Load calibration tool, tool set and connection cables

## Options

- Master curve software
- Temperature/strain dispersion, Temperature/frequency dispersion
- Sample cutting blade, the exchangeable blade type

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