METROTEC

TEXTURE / FIRMNESS ANALYZER COMPUTERIZED
FTM-50 model

Computerized testing equipment designed to analyze properties related to Food Texture in general (Pet Food - Fruits - Snacks - Meats - Vegetables - Fish - Dairy - Nuts - Biscuits - Sausages ...)

TECHLABSYSTEMS

Within the mechanical properties of food, they play a fundamental role in their behavior during processing, storage, distribution and consumption. The influence of the different components on the mechanical properties and especially on the temperature and water content are vital to choose the right equipment for its processing. Thus, the packaging material is designed to protect the food from mechanical stress and from the transfer of water between the product and the environment. By consuming the food we are detecting the texture, which is also affected by the mechanical properties. A widely used term in the food field is elasticity (stiffness) which is the response of the food to an external force. Elasticity will change as the mechanical properties of the food change.

Using the FTM-50 Texture Gauge it is possible to perform physical-mechanical tests on all types of Food, such as: COMPRESSION - ADHESION - CUTTING AND SHEAR - FLEXING or FOLDING - FRICTION - TEARING - PERFORATION - TENSION

FTM-50 model

- **Maximum force capacity: 1 kN**
- **Load cells not included in the standard supply:**

  1 kN - 500N - 250N - 100N - 50N – 20N and 10N
- **Force reading resolution:**

  - o **0.01 N**   with **1000N** Load Cell
  - o **0.005 N**   with   **500N** Load Cell
  - o **0.0025 N** with   **250N** Load Cell
  - o **0.001 N**   with   **100N** Load Cell
  - o **0.0005 N** with   **50N** Load Cell
  - o **0.0002 N** with   **20N** Load Cell
  - o **0.0001 N** with   **10N** Load Cell

- **Tests: Tension - Compression - Flexion - Shear …**
- **Accuracy ± 0.5% (Class 0.5)**
- **Precise electromechanical drive**
- **High stiffness test frame**
- **The FTM-50 Texturometer in standard supply is equipped with METROTEST Test Software and Mini-PC**
- **Large workspace in test area**
- **Ergonomic and precise**

General Information

The **FTM-50 Computerized Texture Analyzer** has the most advanced and reliable structure in an electromechanical test framework with ball circulation spindle. The computerized control system allows for closed-loop control of parameters such as test force, specimen deformation and crosshead travel, etc. The system realizes in real time on the PC screen test diagrams, test curves and creation of test reports. Closed-loop control through the METROTEST test program makes it possible to carry out cyclical tests. By means of a simple connection with different accessories and test tools, tests can be carried out on various Food Products, Cosmetics and also on the Packaging of the sector itself to adjust to your needs in quality control and research.

In the International Standards compliance section, it meets or exceeds the requirements of the following standards: ISO 7500-1, ASTM-E4, EN 10002-2, BS 1610, DIN 51221, and ISO 6892.

To configure the tests in food applications and complete the use of the FTM-50 Texture Analyzer, we optionally have a wide range of accessories and test tools such as **Cylindrical Probes, Conical Probes, Spherical Probes, Meat Shear Tool "WARNER BRATZLER "-KRAMER type Shear Cell - Compression Plates - 3 Point Flex Bridges -Tooth Bite Set" VOLODKEVITCH "- Rice Extrusion Probe -" OTTAWA "Extrusion Probe," MAGNESS TAYLOR "Probes** ..., etc.

The **FTM-50 Computerized Texture Analyzer** is made up of a robust frame in which the test frame is located. The test frame is made up of a low friction coefficient drive and re-circulation ball screw with protectors and a rectified and chromed steel guide column.

The force measurement is through a tension-compression load cell housed in the mobile crosshead. Said load cell is fitted with the different necessary test tools (not included in the standard supply).

The test framework admits overloads of 120% of the nominal force without affecting its measurement or operating precision, which gives the frame a great robustness and safety of correct operation under intensive work.

It has a system of upper and lower travel limiters adjustable independently by the user. Inside the base box are included the transmission elements, the transformer, regulation electronics, servomotor, etc.

Features

- **Fully computerized: The control and measurement system with a specific electronic card used for testing machines, performing the tare to zero and adding a setting which is very reliable.**

- **It has a Database manager for the test results which stores according to a standard format which facilitates analysis and transfer to other programs.**

- **Compliance with testing requirements for all types of materials with all international testing standards.**

- **With a wide range of graph functions, curve color changes, magnifications (zoom), reductions, curve auto-scaling can be performed (making it easier and shorter to run a test with a new material), displacement of the curves in the deformation axis, designate standard curve, association of labels to each graph, indication of the values digitally on the screen and printing of all kinds of test curves.**

- **Modular design makes it easier to upgrade software in the future.**

METROTEST material testing software

METROTEST program based on WINDOWS MS is easy and fast to use to achieve different functions, adaptable to most operator habits. With all the integrated functions such as test sample information, sample choice, data display, data processing, data analysis, test operations … easy to use.

- **Very clear, intuitive, attractive interface design with information on the screen.**
- **Choice of different units for each of the results.**
- **Route of all the points of the graph, point by point.**
- **Association of labels to each graph.**
- **Creation and management of standard curves.**
- **Context sensitive help**
- **Customizable report**
- **Reports in PDF format directly without the need for additional software**
- **Automatic auto scaling on charts**
- **Test limits independent of graph limits**
- **Auto-save of results, specimen by specimen**
- **Single or multiple curve display**
- **Customizable interface**
- **Option to request sample dimensions at the beginning of each trial.**
- **On-screen information of the tasks being carried out by the program (log)**
- **Visual parameterization of results**
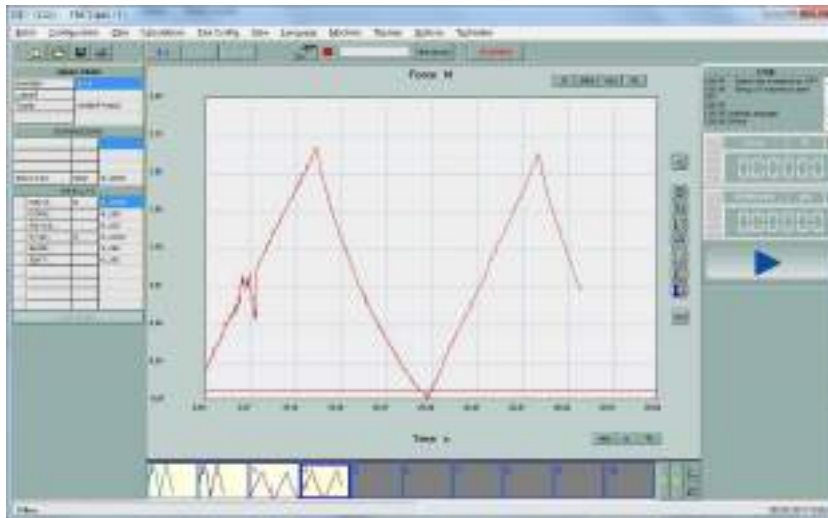
METROTEST Testing Software includes **TPA Texture Profile Analysis**, captures force, distance and time during the test, allowing the calculation of critical texture parameters such as:

- ADHESIVITY / STICK
- COHESIVITY
- HARDNESS
- ELASTICITY
- FRATURABILITY
- GUMMY
- CHEWABLE.

METROTEST testing software allows obtaining other related parameters such as:

- ➢ Simple crunch (CRISP)
- ➢ Loud crunch (CRUNCH)
- ➢ Cutting effort
- ➢ Penetration effort
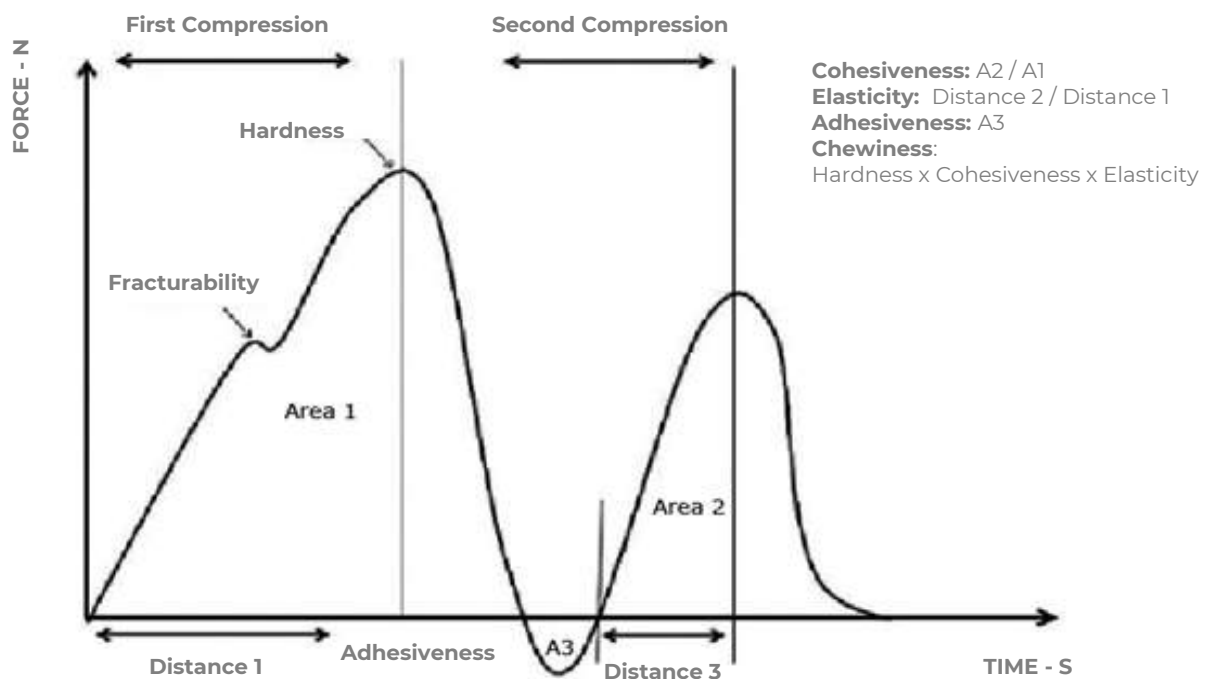- ➢ Effort to slice
- ➢ Extensibility

The **Texture Profile Analysis (TPA)** that is carried out with the **METROTEST** Testing Software, is an excellent instrumental procedure, which simulates chewing with the jaw and helps to measure and quantify physical-mechanical parameters such as: **Hardness, Gummyness, Chewiness , Elasticity, Cohesiveness**, among others, which are related in turn to variables such as the applied deformation rate and the composition of the product, especially in foods such as dairy products, cheeses, fruits and meat products.

Critical parameters that can be achieved with the TPA Software Module that includes the **METROTEST** Software for the FTM-50 Texture Analyzer:

- **Hardness**: Force necessary to deform a product at a given distance; for example, the one necessary to compress it between the molars, to cut it with the incisors, or to compress it between the tongue and the palate. Related terms (Soft - Firm and Hard).

- **Cohesiveness**: Degree to which the sample deforms before breaking when bitten with the molars.

  - **Fracturability** (Fragility): Force with which the sample crumbles, cracks or breaks. It includes how (crumbly, crisp, and brittle) the sample is.
  - **Chewiness**: Related terms (tender, chewy and rubbery)
  - **Gummyness**: Energy necessary to disintegrate a semi-solid food to a state suitable for swallowing. Related terms (crisp, brittle, mealy, pasty, chewy)

- **Elasticity**: Elasticity is defined as the property of a material by which it recovers its original shape and dimensions partially or totally when the action of the applied effort ceases. Related terms (plastic - elastic)

- **Adhesiveness / Stickiness** - It is the work / force necessary to overcome the attractive forces between the surface of the product and the surface of the material (probe) with which the product comes into contact. It is a property of common texture that confectionery products, cooked pasta, raw bakery products possess. Related terms (sticky)

FORCE - N

First Compression   Second Compression

Hardness

Fracturability

Area 1

Area 2

Distance 1   Adhesiveness   A3   Distance 3   TIME - S

Cohesiveness: A2 / A1
Elasticity: Distance 2 / Distance 1
Adhesiveness: A3
Chewiness:
Hardness x Cohesiveness x Elasticity

General Graph of Texture Profile Analysis - TPA

CELLS, TOOLS AND OPTIONAL TEST PROBES

Cylindrical Probes - The principle of the cylindrical probe is that when the probe penetrates the test sample, a shear force acts that causes deformation or breakage of the sample.

Suitable for testing gels, jellies, fruits, yogurt, margarines …

Conical Probes - The conical probe is suitable for measuring the ease of penetration of a sample due to its sharp point.

Suitable for testing vegetable or fruit skin, butter, margarine, yogurt, ice cream, creams, pasta, cosmetics … that have a plastic behavior.

Spherical Probes - The principle of the ball probe is that the uniform compression force is distributed at a normal angle over the entire surface area of the ball. This gives a medium effect on the surface where you are testing.

Suitable for testing pasta, biscuits, chocolate, snacks, fruit, cheese, …

Fracture KIT French Fries and Snacks
It consists of a circular base table support and a 10 mm stainless steel ball probe.

Suitable for testing and determining the Fragility, Fracturability, and Hardness of potato chips, corn chips, and snack food products that are fried or baked.

MAGNESS-TAYLOR Penetration Probe SET
It consists of a set of two cylindrical penetration-punching probes of different sizes. Each pair has a flat tip and a hemispherical tip.

Suitable for testing fruits, vegetables and food products in general.

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TECHLAB SYSTEMS reserves the right to make any technical modification without prior notice.

KRAMER Shear Cell

The parallel steel cutting blades are directed down through grooves to pass through a rectangular container with corresponding grooves at the base. The sample is sheared, compressed, and extruded through the lower openings.

Suitable for testing fruits and vegetables, beans, legumes, peas, cereals ...

WARNER BRATZLER Meat Shear KIT

Used with a Texture Tester, it makes it possible to measure the force required to cut a piece of meat. It consists of a steel frame with a triangular cutting blade. To test a meat sample as a steak, the steak is cooked, cooled, and then cut into samples as accurate as possible for testing.

Suitable for testing sausages, salamis, sausage foods ...

VOLODKEVICH Tooth Bite KIT

Simulates cutting by penetrating a tooth into a food sample. The jaw compresses an upper "tooth" against a lower one during the rehearsal until they were almost touched. The sample is positioned on the lower tooth and the result is the measurement of the maximum load required to bite the sample.

Suitable for testing meat products, vegetables, fruits and crispy products. The results are correlated with tenderness, hardness and firmness of the sample.

KIT Cut Cheese and Butter

The Set is made up of 2 blades with different radii (1 and 0.5mm) and 1 high resistance wire with a 0.7mm radius. These 3 cutting elements are easily interchangeable for use depending on the firmness of the product to be tested.

Suitable for testing and measuring the consistency, spreadability and firmness of flat rectangular samples of cheese, margarines and butters.

Optional:

Test Tool Holder Table, Stainless Steel Collection Tray, Cylindrical Probes, Conical Probes, Spherical Probes, Meat Shear Tool "WARNER BRATZLER" -Cell Shear type "KRAMER" - Compression Plates - 3 Point Flex Bridges -Set Tooth Bite "VOLODKEVITCH" - Rice Extrusion Probe - "OTTAWA" Extrusion Probe, "MAGNESS TAYLOR" Probes …

Functional Technical Specifications

Control unit
- **PC Control and METROTEST Testing Software**
- **Level of breakage of the sample (% of force drop at the end of the test)**
- **Maintenance of Peak Force / Extension in Tension or Compression**
- **Selection of force and deformation units**
- **External control mode by Mini-PC**
- **RS-232 serial port**

Force measurement
- **Range: 2% to 100% - Accuracy 0.5% of applied force**
- **Precision in Forces: Class 0.5 (accuracy ± 0.5%)**
- **Load reading resolution: 1 / 200,000 points:**
  - **1 / 100,000 in Traction**
  - **1 / 100,000 in Compression**
- **Force Data Sampling Rate (internal): 30,000 S / second**
- **Digital load tare 20% with the Load Cell at its maximum capacity**
- **Selectable units: kN, N, cN, kgf, gf, lbf.**
- **Protection system of the Load Cell**
- **Programmable pre-load**
- **18 bit high speed A / D converter**

Measurement of travel (mobile crosshead)
- **Direct measurement from the drive spindles**
- **Single measurement range (1 scale)**
- **Reading resolution: 0.001 mm**
- **Auto-return precision, better than 0.05mm**
- **Selectable units: Millimeters and Inches**
- **Programmable extension limits**

Speed control
- **Servo motor drive**
- **Variable speed range (see table)**
- **Variable return speed within range (see table)**
- **Default speed resolution: <0.02mm / minute**
- **Speed accuracy: ≤ ± 0.5%**
- **Variable Preload speed within the range (see table)**
- **Current protection system**

MODEL	FTM-50
Capacity	1 KN
Force resolution with 500N Load Cell	0,005 N
Measured force accuracy	≤ ± 0,5 %
Displacement resolution	0,001 mm
Accuracy in the course	≤ ± 1 %
Travel of the mobile crosshead	500 mm
Separation between column and grip adapter	150 mm
Range Standard Test Speeds	0,5 – 1000 mm /min.
Accuracy of test speed	≤ ± 1 %
Maximum return speed	1000 mm/min
Spacing between fixings (adapters)	500 mm
Power supply	220V / 50Hz - 110V/60Hz Single-phase
Approximate power	400 W
Working Ambient Temperature and Relative Humidity Condition	10 °C ~ 35 °C | 20% -80%
Test frame dimensions approx.	420x670x950 mm (Width x Depth x Height)
Net Weight approx.	64 Kg
Dimensions Wooden packaging approx.	550x870x1250 mm (Width x Depth x Height)
Gross Weight approx.	110 Kg

STANDARD SUPPLY CONTENT:
* Computerized Texture Analyzer model FTM-50
* METROTEST Multilingual Testing Software
* Management Module with Basic Statistics Pack:
  Bar Charts - Gaussian Bells and Reference Comparison
* 1 Mini-PC with Monitor of 22" - Windows O.S.

* NOTE: The standard supply does not include a load cell or test tools, they must be ordered separately.