Rapid Visco Analyser

RVA 4500

Starch

Extruded Foods

Formulated Foods

Finished Products

Measure Performance of Ingredients and Finished Products

Perten INSTRUMENTS

Ver 4.0 2013.03.11

Rapid Visco Analyser RVA 4500

The RVA measures the viscosity and performance of starches, raw materials, ingredients and foods using controlled temperature and shear. It can be used to characterize ingredients, intermediates and finished products to optimize quality and performance. Temperature and stirring speed (shear) can be programmed to follow international standard methods or your own custom methods, or use the RVA as a miniature pilot plant to mimic realworld manufacturing and preparation processes such as heating, cooling and mixing. RVA 4500 interfaces with a PC and TCW3 software for operation and data management and includes a library of methods for dozens of applications including starch and hydrocolloid performance and degree of cook. RVA 4500 combines speed, precision, flexibility, and automation and is a unique tool for research, product development, process monitoring, QC and QA to optimize ingredient use, product formulation and processing conditions. RVA 4500 offers exceptional sensitivity and accuracy when analyzing low viscosity samples and wide dynamic range when analyzing high viscosity samples.

Features & Benefits

High Sensitivity: Direct drive motor and control system for low viscosity samples.
Wide Viscosity Range: Optimized measurement system for high viscosity samples.
Rapid Viscosity Profile: Standard starch pasting test in 13 minutes.
Robust: Suitable for factory floor to analytical laboratory.
Traceable: Calibration check with traceable standards to satisfy ISO9000 and Quality System requirements.
Glass-free: Safe for food manufacturing areas.
Precise: Accurate, crystal-locked stirring speeds, heating and cooling rates, ensures repeatable results between RVAs.
Standard: Standard methods approved by ICC, AACC International and others.
Relevant: Tailor test routines to emulate processing conditions in industry.
ER/ES Compliant: Electronic Registration/Electronic Signature compliant TCW3 can create traceable, secure results and reports.

Applications

Suitable for R&D, product design, production, quality assurance, quality control, raw material testing, process design and process control.
Starch: Full starch pasting test for native and modified starches using 13 minute standard methods.
Proteins: Wheat gluten, skim milk powder, whey protein concentrate, soy protein.
Gums: Gelling and thickening profiles of hydrocolloids and formulations.
Flour Milling & Baking: Starch quality, gluten quality, amylase activity, weather damage.
Brewing: Malting barley, barley storage, kilned malt and brewing adjuncts.
Dairy: Processed cheese manufacture and melt, soft dairy desserts, ice cream, yogurts.
Extruded and Cooked Foods: Snacks, breakfast cereals, pasta, noodles and petfoods for pasting and degree of cook.
Miniature Pilot Plant: Test new ingredients, formulations and process conditions prior to scale-up.

Specifications

Power Requirements: 240/115VAC, 3.5A, 50/60 Hz.
Input/Output: USB port, RS232 serial port.
Dimensions (H x W x D), Net Weight: 382 x 306 x 345 mm, 18 kg.
Temperature Range: 0-99.9°C.
Heating/Cooling Rate: Up to 14°C/minute (infinitely variable).
Coolant Consumption: Water, 1 l/min at cooling, 100-250 kPa. Chilled coolant required for cooling below room temperature.
Speed Range: Computer controlled infinitely variable 0, 20-2000 rpm.
Viscosity Range: 20-50,000 cP at 80 rpm, 10–25,000 cP at 160 rpm.
Viscosity Accuracy: +/- 2% for S2000 Oil nom. 5000 cP.

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Application & Method

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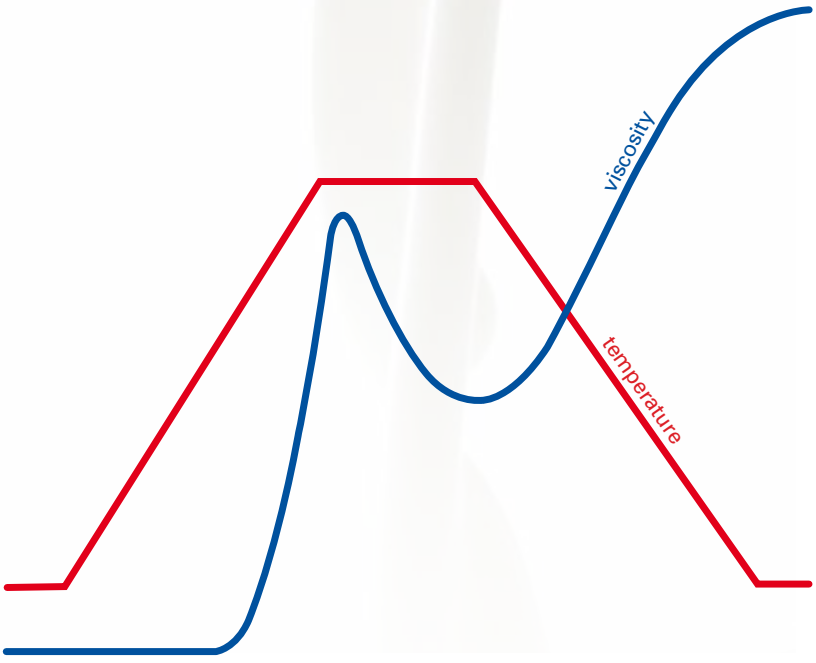


Measure Performance of Ingredients and Finished Products

Perten INSTRUMENTS
a PerkinElmer company

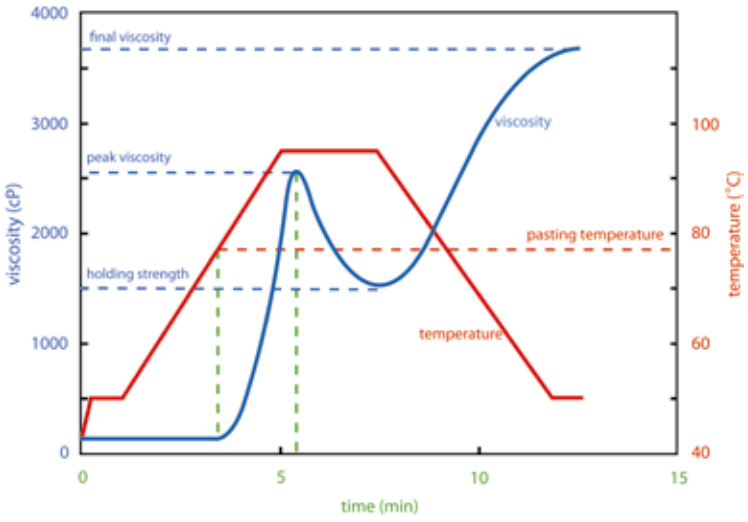
Rapid Visco Analyser (RVA)

The Rapid Visco Analyser (RVA) is a cooking, stirring viscometer with ramped temperature and variable shear capability optimized for testing the viscous properties of starch, grain, flour and foods.

Importance of starch

The Rapid Visco Analyser is a rotational viscometer that continuously records the viscosity of a sample under conditions of controlled temperature and shear. The ability of the RVA to suspend samples in a solvent, maintain them in suspension throughout the test, and apply an appropriate amount of shear to match processing conditions makes it particularly valuable in many process and research applications. The combination of shearing, heating and cooling, applied over time, creates a viscosity curve for the material.

During a standard starch analysis, the starch is heated in an aqueous environment. The starch granule imbibes water and swells, the internal crystalline structure melts (gelatinization), the granule itself breaks down and a continuous gel forms. The viscosity changes produced by heating and cooling starch in water generally provide a characteristic pasting curve.



Starch pasting curve showing typical measurements.

Key features of the viscosity curve

• Pasting temperature, which provides an indication of the minimum temperature required to cook a given sample, can have implications for the stability of other components in a formula, and also indicate energy costs.

• Peak viscosity indicates the water-holding capacity of the starch or mixture. It is often correlated with final product quality, and also provides an indication of the viscous load likely to be encountered by a mixing cooker.

• The rate of breakdown in viscosity to a holding strength, hot paste viscosity or trough, depends on the temperature and degree of mixing, or shear stress, applied to the mixture, and the nature of the material itself. The ability of a sample to withstand this heating and shear stress is an important factor for many processes.

• The re-association between starch molecules during cooling is commonly referred to as the setback. It involves retrogradation, or re-ordering, of the starch molecules, and has been correlated with texture of various products.

• Final viscosity is the most commonly used parameter to define a particular sample's quality, as it indicates the ability of the material to form a viscous paste or gel after cooking and cooling.

Custom curves may be used to study the effect of enzymes, such as alpha-amylase, the characteristics of modified and processed starches and starchy foods, the hydration and viscosity development of hydrocolloids, melt characteristics of ingredients and foods and the properties of protein rich ingredients and foods. The RVA may also be used to simulate manufacture of foods.

The Rapid Visco Analyser Me

Rapid Visco Analyser (RVA)

The RVA is a rotational viscometer that incorporates variable heating, cooling and shear capabilities. It is suitable for a variety of applications requiring accurate viscosity information, such as the testing of starch-based products for quality control. Standardized test profiles are available, including those approved by the American Association of Cereal Chemists (AACC International) and the International Association for Cereal Science and Technology (ICC).

1. Select Method

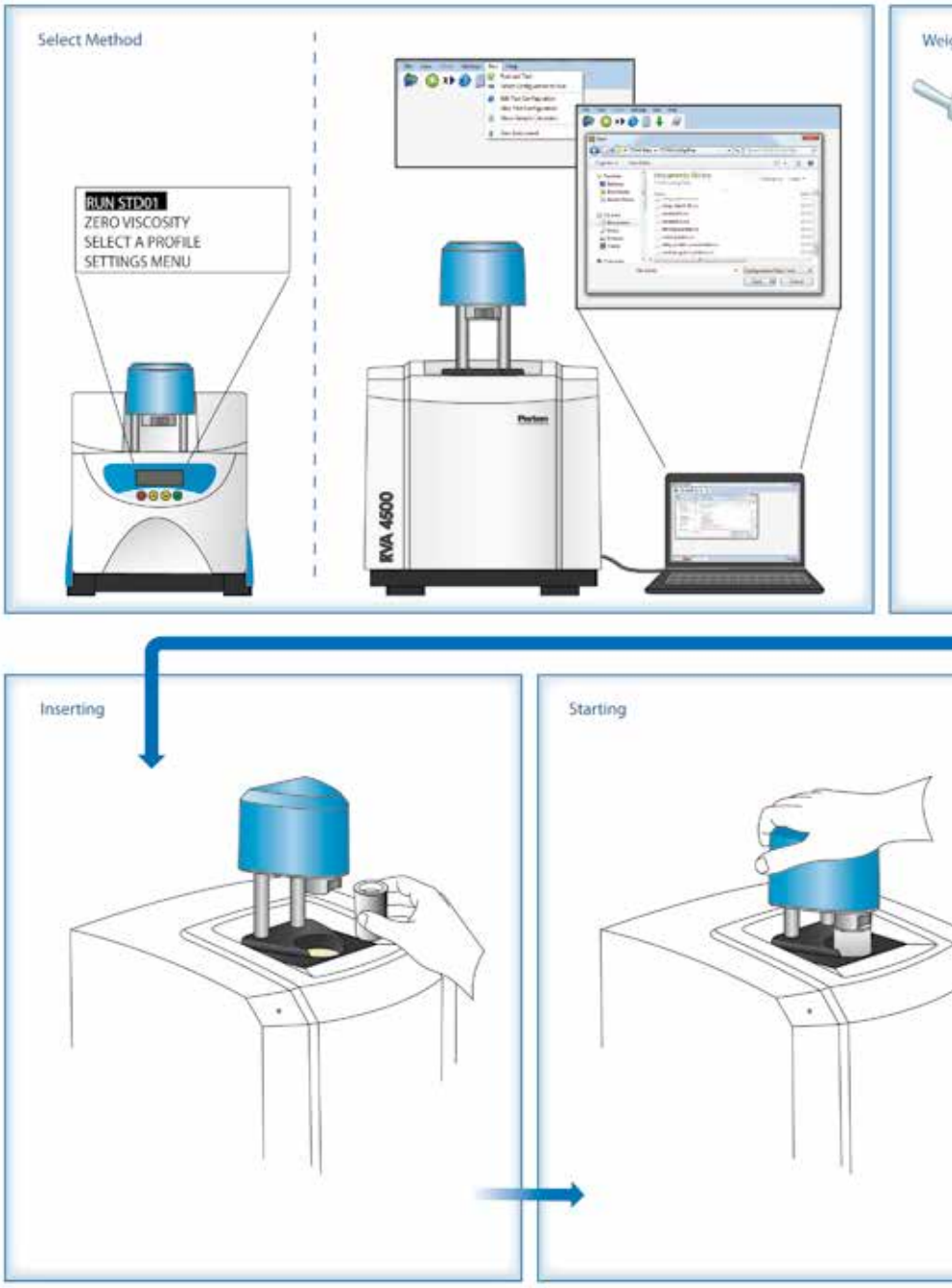
Open the appropriate RVA method in TCW software or select the appropriate RVA method using the instrument keypad if using a stand alone RVA.

2. Weighing

Accurately weigh your sample and water using an electronic balance. Add first the water and then the sample into the canister.

3. Mixing

Place a paddle into the canister, mix and push down any sample lumps.



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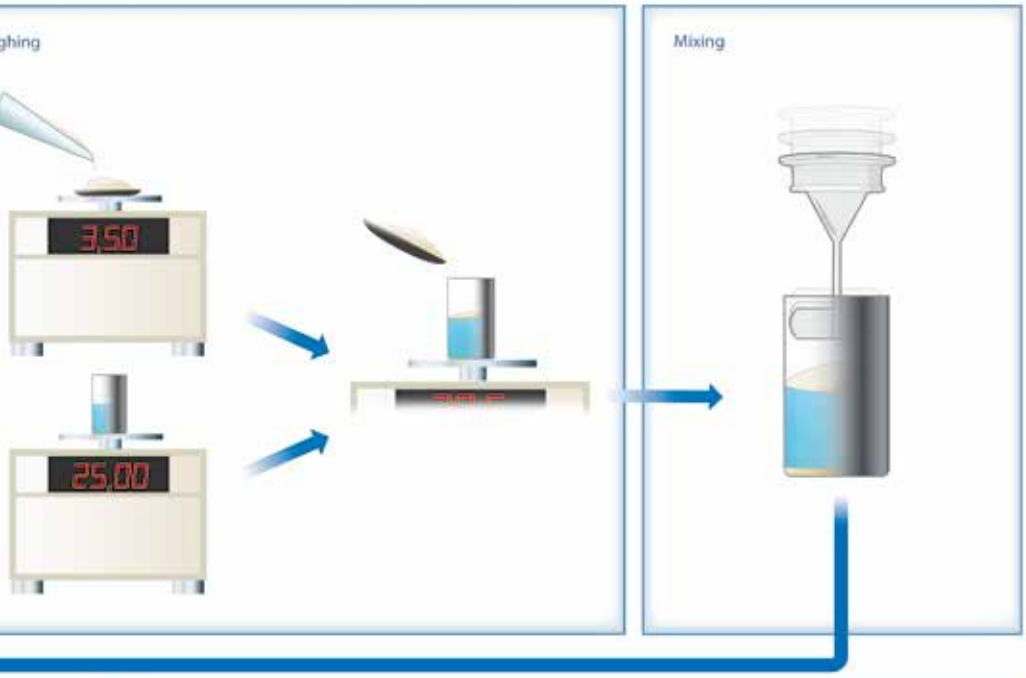
Standard methods

Stirring Number/Sprout Damage: AACC International Method 22-08.01, ICC Standard No. 161, RACI Method 05-05, American Society of Brewing Chemists Barley-12.
General Pasting: AACC International Method 76-21.01, ICC Standard No. 162, PRC Food Professional Standards, LS/T 6101-2002, PRC National Standards, GB/T 24853-2010, CCFRA 2004 Draft FTWG Method No. 23 Version 1.1.
Rice: AACC International Method 61-02.01, RACI Method 06-05, PRC National Standards, GB/T 24852-2010.
Other: MEBAK II, 2006, Chapter 2 Rohfrucht, 2.7 Verkleisterungstemperatur, Germany, pp 106-109, AACC International Method 76-22.01 Pasting Properties of Oat.



4. Inserting

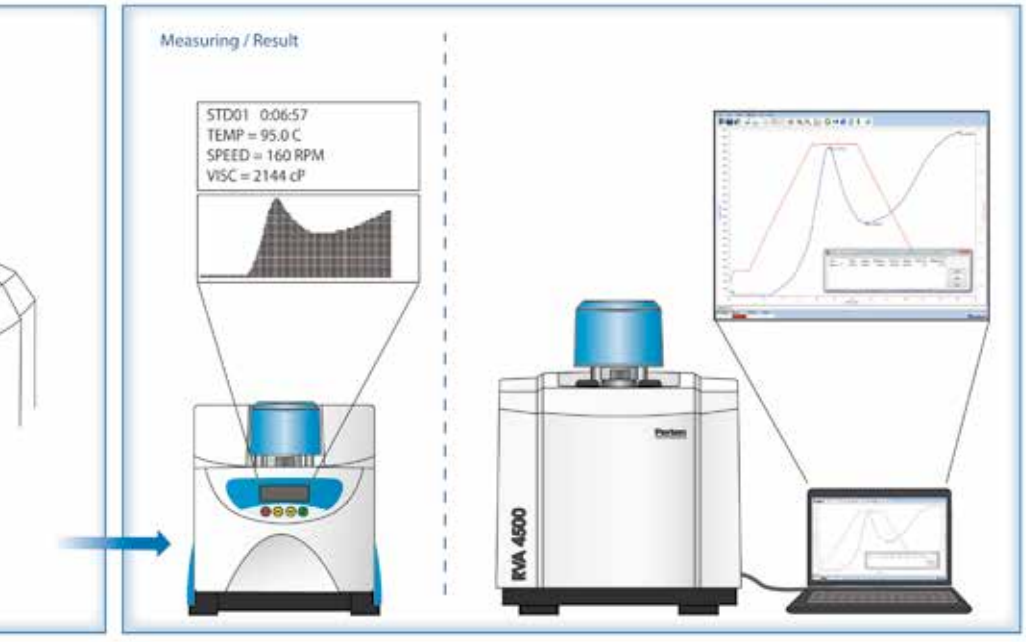
Slide the paddle into the RVA motor coupling.

5. Starting

Depress the tower to lower the canister into the RVA and start the test.

6. Measuring

The viscosity of the sample will be graphed on the monitor or on the display if using a stand alone RVA.



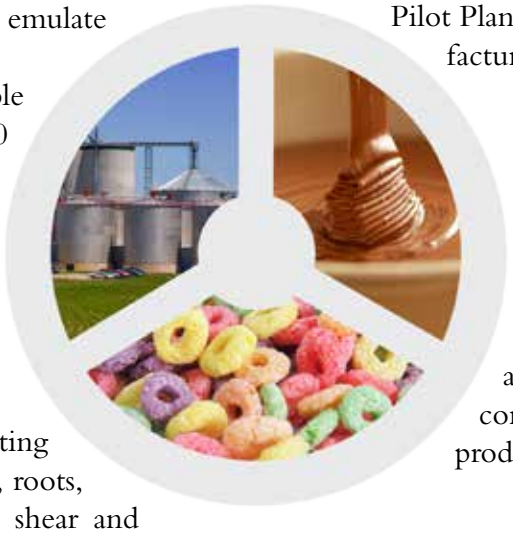
7. Result

The test will end automatically and analysis results will be reported.

Benefits of the RVA

The RVA is a unique tool for product development, quality and process control and quality assurance.

Rapid Viscosity Profile: Standard starch pasting test in 13 minutes.
Easy to Use: Automated operation minimizes training and ensures reliability.
Relevant: Tailor test routines to emulate processing conditions in industry.
Calibration: Check with traceable standards to comply with ISO9000 and Quality System requirements.
Glass-free: Safe for food manufacturing areas.



Starches and starchy samples

Standard and custom starch pasting tests for native starches of grains, roots, tubers and others. Custom high shear and extended temperature tests to monitor the production and end quality of modified starches for food, pharmaceutical, feed and industrial applications.

Milling and Baking

Grain soundness and bug damage, starch pasting quality for cakes, breads, batters, pasta and noodles, flour amylase, malt amylase, fungal amylase, anti-staling, heat treatment of flour, wheat gluten quality and solvent retention capacity test.

Barley – Malting – Brewing

Predicting safe storage life for malting barley, rapid recording mashing system (and the effect of adding enzymes, adjuncts and chemicals to malts), monitoring the progression of malting, predicting barley malting quality and simulated industrial mashing process.

Formulated foods

Viscosity profile of products (premixes & ready to use) such as sauce, ketchup, gravy, dressing, mayonnaise, soup and other low viscosity foods formulated with starches, hydrocolloids & proteins. Melt tests such as chocolate and confectionery and "Miniature Pilot Plant" small scale emulation of manufacturing conditions.

Extruded and Cooked Foods

Starch transformation ("Degree of Cook") of ready to eat breakfast cereals, snack foods, pet foods, aqua feeds and animal feeds at preconditioner, extruder and finished product stages.

Dairy

Process cheese manufacture and melting profile, effect of drying temperature on milk protein powders, rennet caseinate rehydration, dairy beverages, custard, age thickening of sweetened condensed milk and "Miniature Pilot Plant" small scale manufacture of yogurt, ice cream mix and dairy desserts.

Ingredients

Viscosity development of proteins such as soy products, milk proteins, gluten, gelatin and egg whites. Hydration performance and gelling/thickening profile of a system during cooling to fingerprint hydrocolloid behaviour. Precise sample preparation for other types of rheological assessment.

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Required Equipment

RVA Models

RVA models with software

Using the RVA together with the supplied Thermocline for Windows (TCW) software, you can configure and perform a wide variety of tests, graph data and analyze test results.

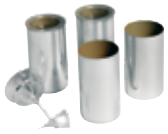
RVA Stand alone models

Using stand alone models, tests are easily run via a keypad and menu with prompts. Methods of your choice are preset in the instrument and a real time display, including the viscosity graph.

Accessories

Robot Dispenser

Automated sample weigher and dispenser saves around one third of sample preparation time, reduces operator error and improves the reliability of RVA results.

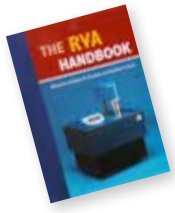


Sample cans & stirring paddles

Coated cans which provide broad spectrum resistance, including at high and low pH, are also available.

Calibration check starch sachets and NIST certified calibration check oil

Ensure that the RVA is operating within specifications in compliance with the principles of Good Laboratory Practice.



RVA Handbook

The RVA Handbook, published by AACC International, helps you to review the scope of applications available, guides you when developing new applications, or improving existing ones, and helps you to interpret RVA test results.

Getting started

To test samples you will require a standard single-phase power supply, a suitable cold water supply, a supply of distilled water (or water of equivalent purity) and a supply of RVA sample canisters and stirring paddles. An analytical balance accurate to at least ±0.01 g is also needed. Depending on your application, you may also require a grinding mill and an adjustable dispenser or pipette. To run ThermoCline for Windows (TCW), you will require a Windows personal computer.