

For The Most Demanding Applications

The J457 Series of Automatic Refractometers

Featuring
Smart Measure™ Technology
(Patent Pending)



United States of America
National Institute of Standards and Technology



NVLAP LAB CODE: 200898-0
Accreditation to ISO/IEC 17025:2005



**RUDOLPH
RESEARCH
ANALYTICAL**

TECHNICAL BULLETIN 930

Rudolph Research Analytical serving it's customers with integrity, Quality, and Innovation for over 50 years.

The J457 comes in three configurations to match your operating conditions



Load and Go Simplicity.

The Rudolph J457 can be configured with a Load and Go Measurement feature for your routine measurements tasks. Initiating a measurement begins by just dropping a sample on the prism, no button to press. All measurements are then made based on the pre-determined Method allowing the J457 to utilize all its capabilities and accuracy with Load and Go convenience.

Exclusive Dual Temperature Control System

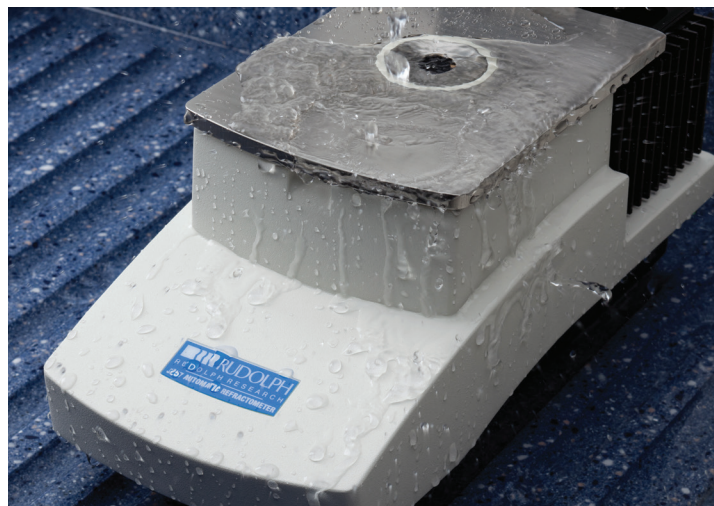
All J457 models come with Rudolph's exclusive Dual Temperature Control System utilizing Peltier Technology. The J457 heats and cools the sample from both prism surface and the sample cover. The insulating cover housing seals against the Prism Well Ring to create a uniform temperature environment providing unmatched temperature control uniformity.

1. J457-SC Standard Configuration

J457-SC Standard Configuration is Rudolph's most popular configuration and provides an excellent combination of a **small footprint** and a **large, easy-to-navigate touchscreen interface**.

2. J457-WC Wall Mount Configuration

J457-WC Wall Mount Configuration is designed for production environments where **water is used for cleaning** or there is a lot of **sample spillage** on the work surface. This configuration is also excellent for situations where there is very **little work space** available: out on the factory floor or in an over crowded satellite laboratory where there is little to no remaining bench space.



3. J457-FC Factory Configuration

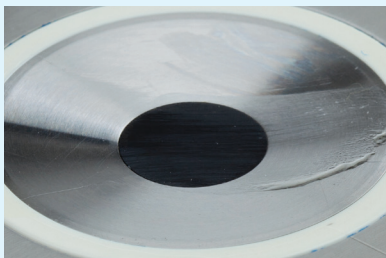
J457-FC Factory Configuration is recommended when there is a lot of **sample spillage** on the laboratory's instrumentation. Factories working with sticky resins and syrups that end up being spilled on the instrumentation are great candidates for the J457-FC as the measurement unit can be as much as six feet away from the display unit.



The J457 Smart Measure™ advantage

Measurement problem:

> Sample residue is left on prism surface



Experience has shown that incorrect measurements are often linked to **cross contamination** caused by the previous sample being inadvertently mixed with the current sample being measured. Ensuring that the prism is properly cleaned between measurements can be difficult for busy environments where multiple operators are involved.

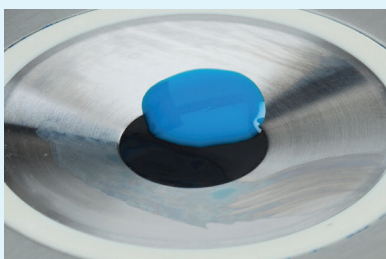
Smart Measure™ solution:

> Automated clean prism monitoring

Smart Measure™ knows when the prism is clean. If the prism surface does not produce the correct "Clean Prism" result then **Smart Measure™ notifies the operator that further cleaning of the prism is necessary**. Smart Measure™ notifies the operator that it is ready to measure after the prism is satisfactorily cleaned.

Measurement problem:

> An insufficient amount of sample covering prism surface



A small drop of sample in the center of the prism will measure correctly. A large drop of sample completely covering the prism surface will measure correctly. **A small drop on the perimeter of the prism will produce erroneous results.**

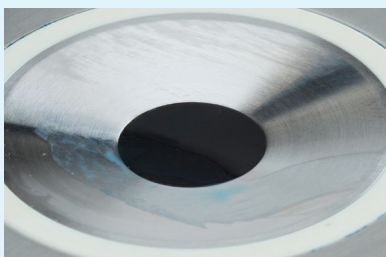
Smart Measure™ solution:

> Automated sample load monitoring

Smart Measure™ knows when a sample has been loaded on the prism and immediately begins evaluating various metrics surrounding the sample load. If Smart Measure™ determines that those metrics indicate proper sample loading, it will display the result with a sample quality number. If Smart Measure™ determines that the metrics indicate an improper sample load, **Smart Measure™ will ask the operator to clean the prism and re-load the sample.**

Measurement problem:

> Sample contamination or improper calibration



An improperly cleaned prism, **where sample residue is left in the measurement well**, can mix with a water zero or calibration fluid. This type of contamination during the calibration process will cause an error across all subsequent measurements.

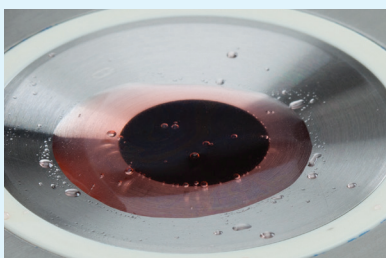
Smart Measure™ solution:

> Automated sample and calibration inspection

Smart Measure™ is constantly measuring the prism surface and monitoring the value measured against its data base of results. **If during a water zero the instrument detects a value that is too different from the data base or the RI value being input is far from the measured value, it will alert the operator.**

Measurement problem:

> The sample has air bubbles that affect measurement results



Many samples have **air trapped** inside them or are carbonated. These samples read well most of the time as long as air bubbles are not trapped between the prism surface and the sample. When this happens the operator gets an erroneous result often referred to as a **flyer**. These results are called **flyers** because the **measured value is quite different from the expected measurement value.**

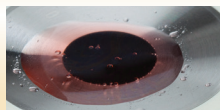
Smart Measure™ solution:

> Scanning technology reduces erroneous results from being displayed

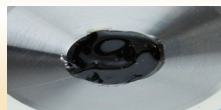
Smart Measure™ catches these flyers by scanning the detector for varying RI values and then alerts the user to reload the sample. Since the user does not get a value to record until a new sample load is completed, Smart Measure™ greatly reduces erroneous measurements from being recorded.

Smart Measure™ Features

Smart Measure™ knows when to measure and display a result even when the operator does not.



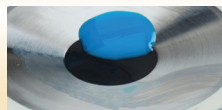
YES



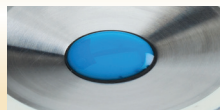
NO



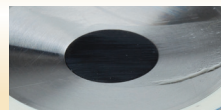
YES



NO



YES



NO

Smart Measure™ Features J457 (All models):

- Dirty prism detection
- Insufficient sample load detection
- Improper water zero detection
- Incorrect calibration detection
- Cross contamination detection
- Trapped air bubble on prism surface detection

J457 Specifications

Refractometer Specifications J457 (All models)

Measurement scales: Refractive Index (nD), Brix (% Sucrose), and up to 100 custom programmed scales

Measurement range: Refractive Index 1.26 – 1.72
Brix 0 – 100

Accuracy: Refractive Index ± 0.00002
Brix 0.015

Reproducibility: Refractive Index ± 0.00002
Brix 0.015

Resolution: Refractive Index 0.00001, Brix 0.01

Temperature control range: 10°C to 110°C (wider temperature range available dependent on ambient conditions and options) Temperature control by dual Peltier system; boost option to 120°C available

Temperature control reproducibility: $\pm 0.01^\circ\text{C}$

Ambient temperature limit: 5°C to 40°C

Temperature correction range: 4°C to 95°C (for sucrose solutions)

Sample temperature limit: -20°C to 250°C

Optical wavelength: 589.3nm (NaD line)

Response time: User configurable, generally less than 30 seconds

Calibration: Using water or NIST traceable fluids. Factory default calibration can always be reset.

Prism: Artificial sapphire

Acid resistance: Hastelloy™ measurement surface (optional)

Data storage/internal memory: 8 GB Non-removable Compact Flash

Display: Adjustable 10.4 inch diagonal, 800-600 pixels, color, Flat Panel Monitor with Resistant Touch Screen Interface, 400 nits brightness, gasketed for spill protection

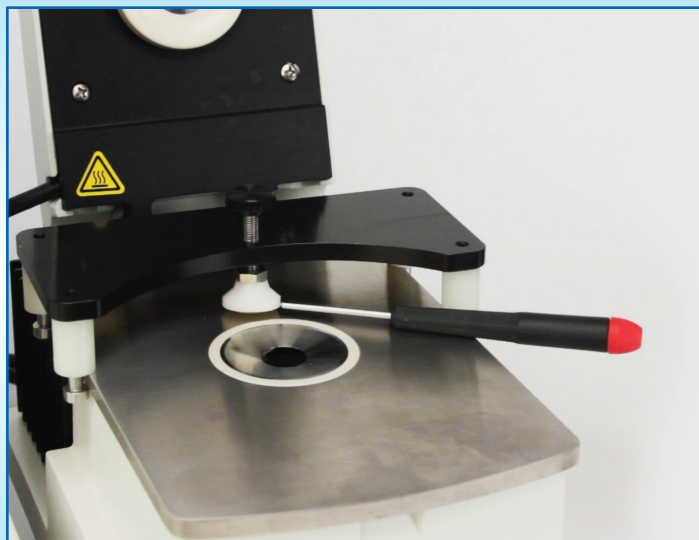
User interface: Touchscreen

Communication interface: 3 USB, RS232 and Cat5 Network (Ethernet)

Operating dimensions/weight: L: 17 1/4" W: 12" H: 13" / 23 lbs.
L: 43.5cm W: 30.5cm H: 33cm / 10.4 kg

Power requirements: 100 - 240 volts, 50 Hz - 60 Hz

J457 for Special Applications - RI Measurement Kit for Solids, Semi-Solids and Films



RI Measurement of Solids, Semi-Solids and Films.

Refractive Index measurement of solids and semi-solids is useful in laboratories for monitoring quality to insure consistency of transparency, and pigmentation. Refractive index is often measured on incoming materials and finished products. Highly accurate RI measurements are possible with the J457 Refractometer, Rudolph's Solid / Film measure option and accessory kit.