RUDOLPH RESEARCH ANALYTICAL

TECHNICAL BULLETIN 938



Laboratory Flexibility with Industrial Strength and Simplicity

The J257 & J357 Series of Automatic Refractometers



CERT #7528.01

Rudolph Research Analytical serving its customers with Integrity, Quality, and Innovation for over 50 years.

Rudolph subjects itself to a variety of industry accreditations and outside examination. Visit our website to learn how these apply to your purchase.

The Rudolph Advantage

The New J257 and J357 Series of Automatic Refractometers from Rudolph Research Analytical bring together Exclusive Rudolph features that provide unmatched performance to improve your process.

Smart Measure™

The J257 and J357 model Series know when a sample is loaded on the prism and will read automatically. The instrument will not read if the prism is not cleaned properly.

TempTrol™

Exclusive Dual Temperature Control System with cooling and heating above and below the sample allows the J357-CC models unparalleled temperature stability and range: ±0.01°C from 5°C- 100°C.

5 Decimal Place Accuracy over the complete RI Range:

Some brands offer a wide RI Range and some offer 5 decimal place accuracy, but only Rudolph's J357-CC provides 0.00002 RI accuracy over a range of 1.26 to 1.72 RI.

Improve your Process with Trend Analysis™

Trend Analysis™ allows you to save a measurement into a method history to track long term stability of your unique methods.

Calibration Reference Materials

CRM's are available at various RI indexes and Temperatures. Contact a customer service representative for assistance in choosing a calibration standard that is right for your your application.



Insulating Ring

When Rudolph's Exclusive TempTrol™ cover with insulative ring is closed it creates a protected micro environment.

Flat Easy To Clean Prism

The flat easy to clean prism is a Rudolph trademark. Sticky, difficult to clean or acidic samples are no problem with Rudolph's optional Hastelloy dish.

Windows Embedded Operating System for Complete Communication Flexibility

Direct connection to LIMS or Server, save data in PDF or Excel files. No PC needed. No other brand offers the flexibility of an Windows Embedded Operating System.

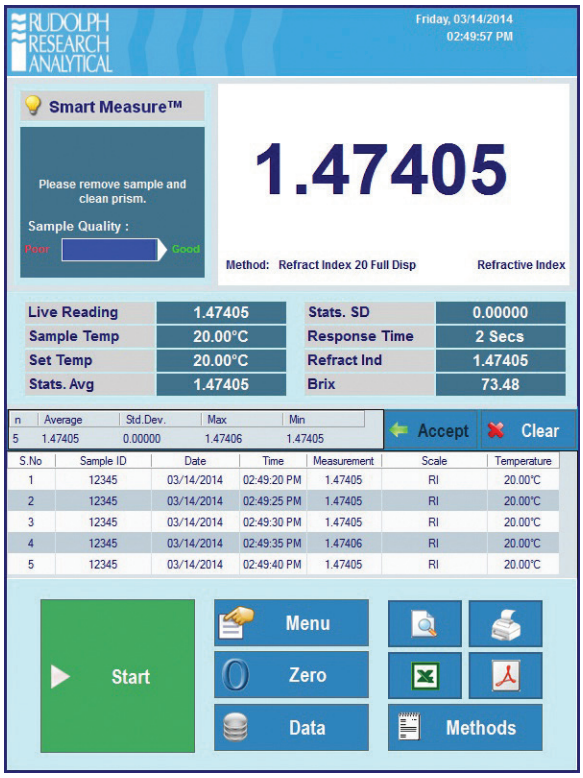
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Interface Flexibility

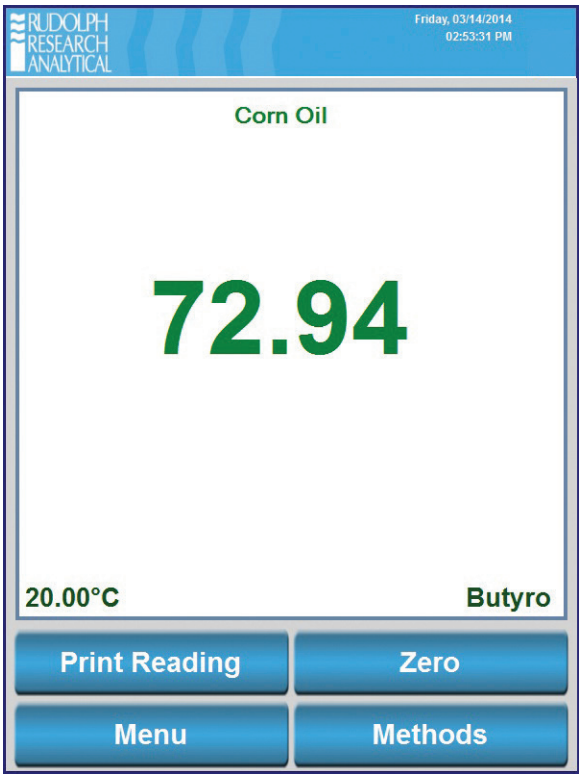
Three Displays Allow For Three Interface Solutions

Rudolph allows the lab manager to select from different display options because we understand laboratories and manufacturing floors have different needs when it comes to the information required for monitoring a process. Your instrument's interface can be customized to meet the information your application and environment demand whether you choose our full featured interface or our Load-and-Go™ display interface. The J257 and J357 offer laboratory flexibility with industrial strength and simplicity making this model series at home on the laboratory bench or on the factory floor.

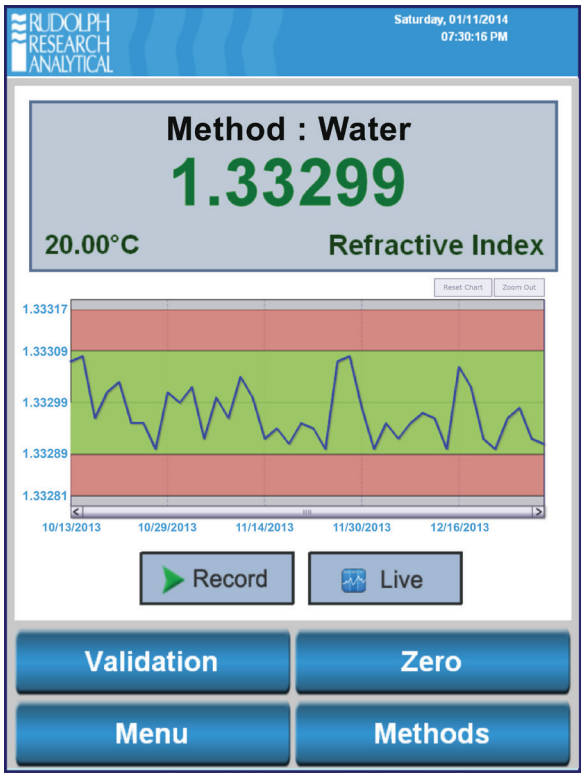
Full Display with Smart Measure™



Load - and - Go™ Display



Trend Analysis™ Display



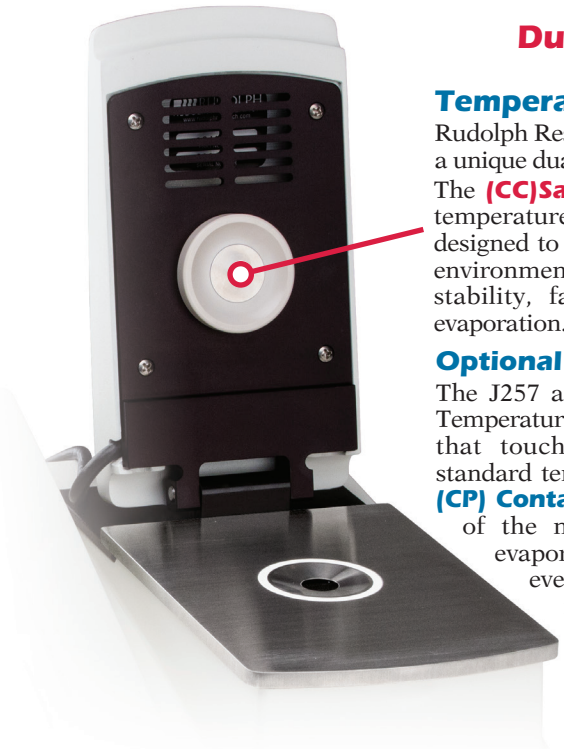
In a modern factory, the most precious commodity is time. When a process starts to move outside its limits people want to know FAST. They want to correct the problem, preferably while it's still small and before a product goes out of specification.

The Rudolph live reading and **Trend Analysis™** feature allows users to easily and quickly see how a process is going and catch minor deviations before they become major ones.

Even in the most tightly controlled manufacturing environments, things do occasionally go out of specification. When an out of specification condition happens, material has to be quickly identified and decisions made as to what to do with the product. Long term data collection is a part of any good process. Knowing when and where the out of specification condition happened is equally as important. Rudolph Trend Analysis™ software quickly shows a supervisor the process history and where the problem occurred.

Exclusive TempTrol™

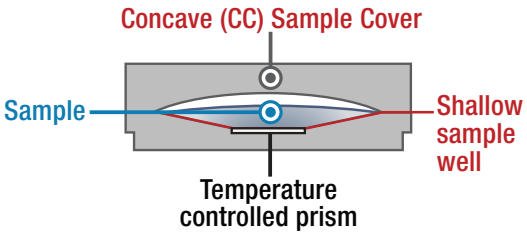
Dual Temperature Control System



Temperature Controlled Concave Sample Cover (CC option is standard)

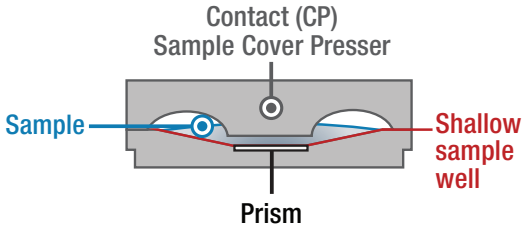
Rudolph Research Analytical's J357 is able to control temperature to 100°C because it has a unique dual temperature control system where heat is applied to both sides of the sample.

The **(CC)Sample Cover** is controlled to the same temperature as the prism and, when lowered, is designed to provide a temperature controlled micro environment that provides unrivaled temperature stability, fast measurement time and minimal evaporation.



Optional Contact Presser (CP Option)

The J257 and J357 are available with an optional Temperature Controlled Sample Presser (CP option) that touches the sample. Compared with the standard temperature controlled cover, the optional **(CP) Contact Presser** reduces the empty volume of the measurement area thereby decreasing evaporation and at the same time helping to evenly spread semi solid materials over the measurement prism. This feature offers improved performance on many samples such as PET and Glycerine.



Petroleum Solutions

TempTrol™ allows measurement of ASTM 1747 for full Petroleum Solutions

- ASTM D1218
- ASTM D5006
- Fuels
- Waxes
- ASTM D1747
- Oils
- Lubricants



Meeting the needs of all the ASTM standards.

Designation: D 1747-99

Standard Test Method for Refractive Index of Viscous Materials

1. Scope

1.1 This test method covers the measurement of refractive indexes, accurate to **two units in the fourth decimal place,** of transparent and light-colored viscous hydrocarbon liquids and melted solids which have refractive indexes in the range **between 1.33 and 1.60**, and at **temperatures from 80 to 100°C**. Temperatures lower than 80°C can be used provided that the melting point of the sample is at least 10°C below the test temperature.

Pharmaceutical and Toxicology Testing

Exclusive RI Range: 1.26 - 1.70 and 5 decimal accuracy allows Pharmaceutical and Toxicological Testing.

- Total Parenteral Nutrition (TPN)
- Toxicology testing (Urine SG)
- Pharmacy compounding and drug diversion
- USP <831>
- EP 2.2.6
- Enflurane
- Sevoflurane



Official Monographs, USP 31 / ***Sevoflurane*** 3867

• Sevoflurane

$C_4H_3F_7O$ 200.05

Propane, 1,1,1,3,3,3-hexafluoro-2-(fluoromethoxy)-

Fluoromethyl 2,2,2-trifluoro-1-(trifluoromethyl)ethyl ether [*28523-86-6*].

Refractive index (831): between 1.2745 and 1.2760, at 20°C

Enflurane, Sevoflurane and similar halogenated ethers are used extensively for the induction and maintenance of general anesthesia. Their manufacture must comply with specifications from the USP/EP or relevant pharmacopeias. Many of these pharmacopeias require the measurement of refractive index. **For example, the US Pharmacopeia requires that sevoflurane has a refractive index of 1.2745 - 1.2760 at 20°C.**

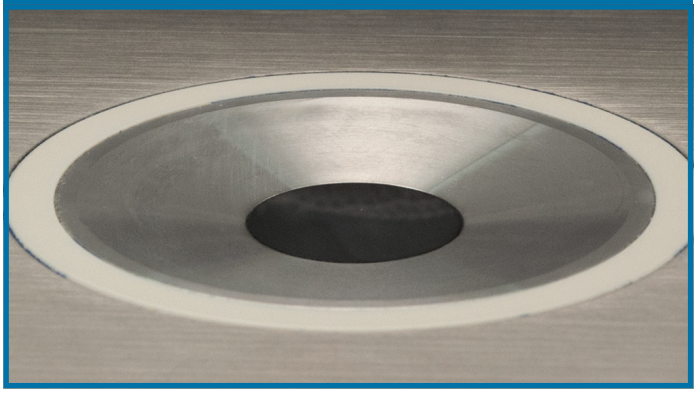
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Measurement Surface

Ultra Flat

Easy to clean prism – No matter how good the refractometer is, the results will only be right if the instrument is clean. **Rudolph's flat prism design makes cleaning easy,** even with sticky syrups. The flat low profile sample well with a sample volume of less than 1ml is easily cleaned by wiping with a common paper towel. A single cleaning surface with **scratch-proof sapphire prism** makes this a popular choice for high throughput laboratories.

Ultra Flat Prism



The flat open sample area has no corners to trap even sticky materials and is resistant to almost all solvents including Acetone, Toluene and similar organics. Choose H option for HFl and HCl acids.

Ultra Hard Sapphire Prism

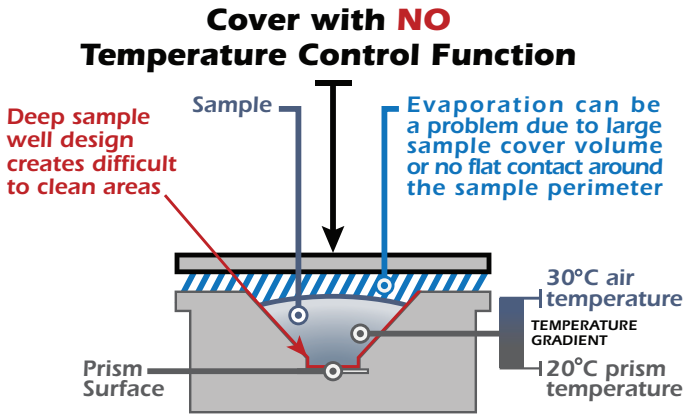


Some manufacturers use glass or YAG (Yttrium-Aluminum-Garnet.) prisms. These prisms are softer than sapphire and have slower temperature transfer coefficients.

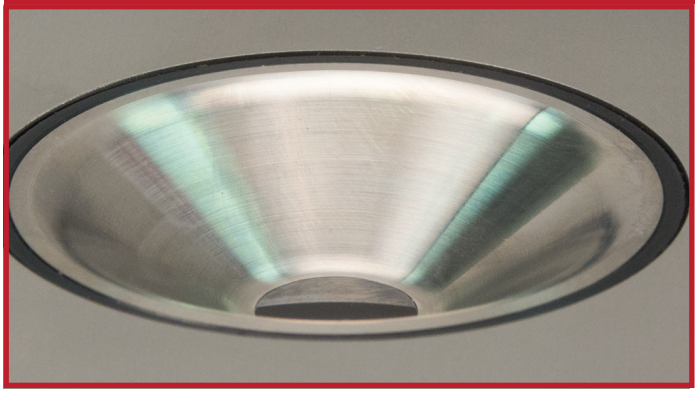
Don't worry you can clean the Rudolph prism with regular paper towels, no special cleaning paper is required.

Other manufacturer's compromise

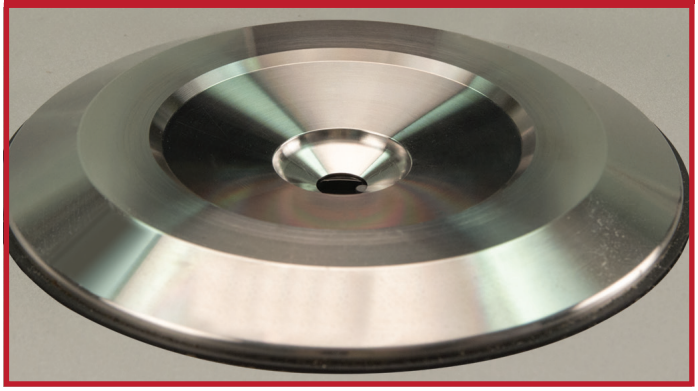
From the pictures below one can see that **other manufacturers have to make a compromise with the depth and angle of the sample well.** Since these manufacturers use one sample well and cover design for both temperature applications, they end up with a **sample well that is too narrow and deep. The deep sample well makes cleaning needlessly hard** at ambient temperature while failing to provide ideal temperature control when the sample and air temperature are more than 10°C from the desired measurement temperature.



Competitor 1



Competitor 2



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Specifications

Market Focus	**Petroleum, Chemical, Pharmaceutical Related Industries**	
Instrument Model	**J257**	**J357**
Measurement Range	Refractive Index 1.26-1.72 Brix 0-100	Refractive Index 1.26-1.72 Brix 0-100
Accuracy	Refractive index ±0.0001 Brix ±0.05	Refractive index ±0.00002 Brix ±0.015
Reproducibility	Refractive index ±0.0001 Brix ±0.05	Refractive index ±0.00002 Brix ±0.015
Resolution	Refractive index ±0.0001(Standard), ±0.00001 (Optional) Brix ±0.1	Refractive index ±0.00001(Standard), ±0.000001 (Optional) Brix ±0.01
Temperature Control Range (°C) (within 10°C of ambiant)	10°C to 100°C	10°C to 100°C
Flat Easy to Clean Prism Sample Dish	STANDARD	STANDARD
CC Cover	STANDARD	STANDARD
CP Presser	OPTIONAL	OPTIONAL
GP Cover	AVAILABLE	AVAILABLE
Smart Measure	STANDARD	STANDARD
21CFR Part II	OPTIONAL	OPTIONAL
Operating System	Windows Embedded	
Measurement Scales	Refractive Index (nD), Brix (% Sucrose), and up to 100 custom programmed scales	
Temperature Resolution	±0.01°	
Temperature Repeatability	+/- 0.002	
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)	
Measurement Response time	User configurable, can be less than 2 seconds	
Calibration	Using water or NIST traceable fluids. Factory default calibration can always be reset.	
Prism	Synthetic Sapphire	
Light Source	Light emitting diode (Estimated life 100,000 hours)	
Acid resistance	Hastelloy™ measurement surface (optional)	
Data storage/internal memory	32 GB Non-removable Compact Flash	
Display	8” color Touchscreen, 800x600 pixel resolution with 400 nits of brightness	
Communication interface	3 USB, RS232 and Cat5 Network (Ethernet)	
Operating dimensions/weight	L: 17 1/4 inches W: 12 inches H: 13 inches / 23 lbs. L: 43.5 cm W: 30.5 cm H: 33 cm /10.4 kg	
Shipping dimensions/weight	L: 27 inches W: 21inches H:17 inches /30 lbs. gross weight L: 68.58cm W: 52 cm H: 43.18 cm /13.6 kg	
Power requirements	100 - 240 volts, 50 Hz - 60 Hz	

Refractive Index Validation and Calibration Kits

All Purpose

A23180 General Use NIST Traceable Calibration Fluids Kit
Kit consists of the following (5) NIST traceable calibration fluids (1 oz. each):

- A21752-1.3330-W RI Certified Water 20°C with table for 10-70°C
- A21752-1.350-20/Brix 10
- A21752-1.460-20/Brix 70
- A21752-1.516-Multi Temperature Fluid (20°, 30°, 40°)
- A21752-1.650-20 nominal RI

Pharmaceutical

A23180-VLR NIST Traceable Calibration Fluids Kit
(Special version for measuring halogenated ethers and general pharmaceuticals)

Kit consists of the following (5) NIST traceable calibration fluids (1 oz each):

- A21752-1.29-20
- A21752-1.3330-W RI Certified Water 20°C with table for 10 - 70°C
- A21752-1.460-20/Brix 70
- A21752-1516-Multi Temperature Fluid (20°C, 30°C, 40°C)
- A21752-1.650-20 nominal RI

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