For high throughput, high accuracy applications

Refractometer Selection Guide

Meeting the needs of your industry and application
- Food and Beverage
- Sugar Milling, Refining, Processing
- Chemical
- Pharmaceutical and Toxicology Testing
- Petroleum
- Flavor, Fragrance, Cosmetics

Rudolph Research Analytical, serving its customers with Integrity, Quality, and Innovation for over fifty years.
Choosing A Refractometer

A Refractometer that’s right for your industry and application

Every industry has its unique application requirements, environmental constraints and operator handling issues with which to contend. It is for this reason, that Rudolph has more than 10 different model variations to ensure that we have the right solution for your situation.

Maybe you are a pharmaceutical company looking for an instrument which can measure below the standard food refractometer range of 1.33 - 1.53 to comply with the USP monograph for Sevoflurane (refractive index range of 1.2745 - 1.2760) or other halogenated ethers and pharmaceuticals measuring below 1.3 RI. Maybe you’re a flavor, fragrance or essential oil manufacturer or blender dealing with Cinnamic Aldehyde or the many products in this industry having Refractive Indices greater than 1.60 RI.

Possibly your main concern is not the range of the refractometer but the reproducibility of results – just listen to what one of our customers has to say after switching to Rudolph after years with another brand:

“Just wanted to let you know how pleased our company is with the J57HA Automatic Refractometers. We currently have two of the instruments in service in our sugar testing laboratories and are in the process of ordering three additional refractometers.

Before the decision was made to switch our laboratories to the J57HA Refractometers, rigorous testing was done on the instrument over the past year in our Quality/Research Laboratory.

It has been our policy when doing research type work, using our old refractometers, that we place a sample on the prism, set a timer for two minutes, then press the “Read” button until we get three readings in a row that are identical (this could take up to 12 readings). With the J57HA instrument, we place the sample on the prism, press the “Measure” button and in about 15 seconds we have a stable number. The instrument is so stable in fact, that I can honestly say after using the instrument for over a year, we have never had a different reading from the original measurement, no matter how many times we repeatedly press the “Measure” button.”

– R.R., Senior Process Chemist, Western Sugar Cooperative

How to use this guide

Although there are many common problems that are similar across all industries: like sample cleaning, sample cross contamination, dirty prism, improper water zero, some problems are unique or have a different level of importance to a particular industry. This model selection guide allows you to see which models are the most popular in your industry and why. Just select the category that best reflects your industry and then call us to help solidify your model selection. Our technical sales representatives understand that the initial price is an important part of the purchasing decision but only part of that decision; equally, if not more important is purchasing an instrument that works as intended for the application and meets all relevant standards, regulations and requirements in the area in which you work.
The Rudolph Advantage

Below are a few of the reasons customers replaced their old refractometer with a J-Series from Rudolph

<table>
<thead>
<tr>
<th>Problem</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>You are tired of arguments over shadowline interpretation on your Abbe Refractometer.</td>
<td>J-Series Internal Reflection Refractometers use scratch proof artificial sapphire prisms that measure the reflected light not the transmitted light, like the Abbe, so dark samples measure as easily as clear samples. Just put a drop of sample on the prism, press measure and walk away. No shadow line, no manual balancing or interpretation.</td>
</tr>
<tr>
<td>Waterbath maintenance is costly and time consuming.</td>
<td>The J-Series has an electronic peltier temperature control solution that is right for you. Select your temperature through the touch screen and watch the instrument quickly come to temperature and make a measurement all in one easy step.</td>
</tr>
<tr>
<td>Your old refractometer was great when you bought it but now it is being repaired more and more often while measurement instability wastes time and money.</td>
<td>Our customers say it best: &quot;This instrument has greatly reduced our sample time and improved our accuracy. Calibration of the instrument is easy and rarely required. We have had no problems or issues with the two instruments that we currently have in service... I would highly recommend the Rudolph J57HA Refractometer over any other brand of refractometer that I have used or tested throughout my many years working in the sugar industry.&quot;</td>
</tr>
</tbody>
</table>

| Why switch to a Rudolph Research Refractometer? Superior temperature control and easy to clean prism |
|---|---|
| **Rudolph's dual temperature control system** | **Measuring RI or Brix far from ambient air temperature** |
| Rudolph Research Analytical is the only refractometer manufacturer to offer electronic temperature control from both prism and presser surfaces. The requirements of an electronically temperature controlled refractometer operating close to ambient air temperature are very different from the temperature control requirements of a refractometer operating more than 10°C from ambient air temperature. Only the Rudolph J Series is designed to be the perfect refractometer for both applications. | The J57/257/357 shallow well with temperature control from the sample presser and prism surface offers superior temperature control while still maintaining ease of cleaning. Rudolph's temperature controlled presser creates a mini temperature controlled environment where the entire sample is held at the measurement temperature. This design minimizes the inaccuracies created by temperature gradients across the sample as deep well prisms fight to control temperature from the prism surface while the air and upper part of the sample have widely divergent temperatures. (See Figure lower left) |

<table>
<thead>
<tr>
<th><strong>Rudolph's dual temperature control system</strong></th>
<th><strong>Rudolph's dual temperature control system</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Rudolph's dual temperature control system</td>
<td><strong>Measuring RI or Brix close to ambient air temperature</strong></td>
</tr>
<tr>
<td>Rudolph Research Analytical is the only refractometer manufacturer to offer electronic temperature control from both prism and presser surfaces. The requirements of an electronically temperature controlled refractometer operating close to ambient air temperature are very different from the temperature control requirements of a refractometer operating more than 10°C from ambient air temperature. Only the Rudolph J Series is designed to be the perfect refractometer for both applications.</td>
<td>The J57's shallow sample well and presserless design makes cleaning easier than deep well prism designs while still maintaining accuracy. The deep sample well of competing refractometers is not needed when there is less than a 10°C difference between the prism temperature and air temperature because the temperature gradient across the sample is small.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Other manufacturers at all temperatures</strong></th>
<th><strong>Other manufacturers at all temperatures</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Presser lid with no temperature control function</td>
<td><strong>Other manufacturers compromise</strong></td>
</tr>
<tr>
<td>Presser lid with no temperature control function</td>
<td>From the pictures below one can see that other manufacturers have to make a compromise with the depth and angle of 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.</td>
</tr>
</tbody>
</table>

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# Food and Beverage

- Seed oils
- Soybean oils
- Candy
- Syrups
- Dairy products
- Edible oils
- Coffee extracts
- HFCS
- Juices
- Juice concentrates
- Fruit products
- Confections
- Starch
- Milk
- Hydrolysate products
- Vegetable products
- Teas
- Sodas
- Sauces
- Soups
- Jams
- Jellies
- Soft drinks

## Feature Highlight

**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. The J57 single cleaning surface with *scratch-proof sapphire prism* makes this a popular choice for high throughput food laboratories.

## Models and Specifications

<table>
<thead>
<tr>
<th>Models</th>
<th>Specifications</th>
<th>Features and Benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>J57HA</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Measurement Range: 1.33 - 1.53 RI; 0 - 95% Brix</td>
<td></td>
<td>Brix results can only achieve accuracy in the real world if the sample area is cleaned properly. <em>Rudolph’s shallow prism design has no corners or steep angles to trap sticky samples thus avoiding or reducing the problem of cross contamination between samples</em>. The simple, easy to use user interface with large measure button and key lock out feature makes it a popular choice for busy factory labs. Gloved hands and elbows like the big measure key.</td>
</tr>
<tr>
<td>Accuracy: ±0.00002 RI, ±0.02 Brix</td>
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<tr>
<td>Electronic Temperature Control: Fixed temperature selection: 20°C and 25°C</td>
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</tr>
<tr>
<td><strong>J157-CC-AM</strong></td>
<td></td>
<td>The J157-CC-AM with non-contact cover (CC) and Auto Measure (AM) are popular option choices for food applications where the sample must be protected from a harsh environment and custom scales are required. Auto Measure (AM) allows for easy measurement on/off by just lifting the presser cover to stop a measurement and closing the cover to start a measurement.</td>
</tr>
<tr>
<td>Measurement Range: 1.33 - 1.53 RI; 0 - 95% Brix</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Accuracy: ±0.00002 RI, ±0.02 Brix</td>
<td></td>
<td></td>
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<tr>
<td>Electronic Temperature Control: Flexible temperature selection between 15°C - 50°C</td>
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<tr>
<td><strong>J357-CC-AM</strong></td>
<td></td>
<td>J357-CC-AM is best for high temperature food applications where the product is more stable when measured at a high temperature. For example, the J357 temperature control system is set for 70°C and temperature correction is set for 20°C. The J357 heavy duty temperature control system ensures the sample stays at 70°C while the instrument displays a temperature corrected result of what the sample would read if it were 20°C.</td>
</tr>
<tr>
<td>Measurement Range: 1.26 - 1.70 RI; 0 - 95% Brix</td>
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<td></td>
</tr>
<tr>
<td>Accuracy: 0.00004 RI, 0.03 Brix</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electronic Temperature Control: Flexible temperature selection between 15°C - 100°C; TB option: allows 15°C - 110°C with one hour boost to 120°C</td>
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</tr>
</tbody>
</table>
**Sugar Milling, Refining, Processing**

- Cane sugar milling and refining
- Beet sugar milling and refining
- Invert sugar
- Liquid sugar
- Confectionary sugar
- Molasses
- Brown sugar

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**Feature Highlight**

Pour through refractometers are designed for measuring cane or beet juice in a sugar mill. This design has two important benefits: **cleaning becomes part of the sample loading process and measurement time is reduced because one sample is poured in after another** making the design attractive for seasonal operators. The small funnel design forces improved sample flushing by increasing the number of sample pours.

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### Models

<table>
<thead>
<tr>
<th>Models</th>
<th>Specifications</th>
<th>Features and Benefits</th>
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</thead>
</table>
| **J57HA** | - Measurement Range: 1.33 - 1.53 RI; 0 - 95% Brix  
- Accuracy: ±0.00002 RI, ±0.02 Brix  
- Electronic Temperature Control: Fixed temperature selection: 20°C and 25°C | The J57HA’s simple interface and easy to clean prism surface make it one of our most popular models for the sugar industry. Temperature control to 20°C and 25°C makes it perfect for molasses and high Brix samples. Measurement speed can be improved by using **Temperature Correction** in conjunction with **Temperature Control**, allowing measurements to be made accurately almost as soon as the sample is placed on the prism. |
| **J157-CC-AM** | - Measurement Range: 1.33 - 1.53 RI; 0 - 95% Brix  
- Accuracy: ±0.00002 RI, ±0.02 Brix  
- Electronic Temperature Control: Flexible temperature selection between 15°C - 50°C | The J157-CC-AM is also quite **popular with sugar factory labs**. The non contact cover (CC) with **built in electronic heating and cooling improves performance in harsh conditions**. The Auto Measure (AM) feature allows the closing and opening of the cover to start and stop the measurement **eliminating the need for the operator to touch the interface**. Very popular for factory floors where air temperature varies dramatically: cold at night and hot during the day. |
| **J157-PTW** | - Measurement Range: 1.33 - 1.53 RI; 0 - 95% Brix  
- Accuracy: ±0.00002 RI, ±0.02 Brix  
- Electronic Temperature Control: KVP: Select any temperature between 15°C - 30°C  
PTW: Select any temperature between 15°C - 40°C | The J157-PTW can be operated as a **pour through refractometer** when measuring juices and then by loosening one thumb screw and lifting the hinged presser the instrument can be used like a J57. This allows the J157-PTW to measure molasses and other high Brix samples. The J157-KVP has a **vertical prism that allows suspended solids to fall past the prism surface instead of on to the prism**. The small funnel volume design with integrated over flow funnel increases sample flushes and reduces spillage. The J157-KVP is often favored in applications with highly turbid samples. |

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**J157-KVP Model**

This port is connected to tubing and flows to waste...

Small funnel design  
Over-flow area to avoid spillage

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**J157-KVP**

Thumb screw  
Feature highlight above
## Chemical

### Water Based:
- Resins
- Polymers
- Coolants
- Gels
- Acids

### Petroleum Based:
- Oil based paints
- Fine chemicals
- Fluranes
- PET: polyethylene terephthalate
- Polymers
- Resins
- Solvents
- Plastics

### Feature Highlight

All J Series refractometers are designed for high chemical resistance from the outset with the wetted parts being sapphire, Tectron® and 316 stainless steel. However, when using HCl and other caustic compounds, 316 stainless steel is not resistant enough. For these applications Rudolph offers an extended chemical resistance option where the sample dish and cover are made from Hastelloy (H Option).

### H Option suggested applications
- Hydrofluoric acid at all concentrations
- HCl and similar acids at all concentrations
- Strong alkalis
- Strong oxidizing agents

For plastic manufacturers who measure liquids and solids like PET, Rudolph has a Contact Presser (CP) with extra weight.

### (CP) Option suggested application
- PET: polyethylene terephthalate

### Water-Based Chemical Models

<table>
<thead>
<tr>
<th>Specifications</th>
<th>Features and Benefits</th>
</tr>
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<tbody>
<tr>
<td><strong>J57HA</strong></td>
<td></td>
</tr>
<tr>
<td>- Measurement Range: 1.33 - 1.53 RI; 0 - 95% Brix</td>
<td></td>
</tr>
<tr>
<td>- Accuracy: ±0.00002 RI, ±0.02 Brix</td>
<td>A refractometer can only achieve real world accuracy if the prism is cleaned properly between samples. 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 (HA) option for HFl and HCl acids.</td>
</tr>
<tr>
<td>- Electronic Temperature Control: Fixed temperature selection: 20°C and 25°C</td>
<td></td>
</tr>
</tbody>
</table>

| **J157-CC-AM**                    |                       |
| - Measurement Range: 1.33 - 1.53 RI; 0 - 95% Brix |                       |
| - Accuracy: ±0.00002 RI, ±0.02 Brix          | DUAL TEMPERATURE CONTROL SYSTEM |
| - Electronic Temperature Control: Flexible temperature selection between 15°C - 50°C | Unlike other temperature controlled refractometers, the J157/257/357 have temperature control from both above and below the sample. The 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. Depending on options, the Sample Cover can also be used to initiate measurement. (Select AM option) |

### Petroleum-Based Chemical Models

<table>
<thead>
<tr>
<th>Specifications</th>
<th>Features and Benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>J257-CC-AM</strong></td>
<td></td>
</tr>
<tr>
<td>- Measurement Range: 1.26 - 1.70 RI; 0 - 95% Brix</td>
<td></td>
</tr>
<tr>
<td>- Accuracy: 0.0001 RI; 0.1 Brix</td>
<td>OPTIMAL CONTACT PRESSER (CP OPTION)</td>
</tr>
<tr>
<td>- Electronic Temperature Control: Flexible temperature selection between 15°C - 70°C</td>
<td>The J157/257/357 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 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.</td>
</tr>
</tbody>
</table>

| **J357-CP-AM**                    |                       |
| - Measurement Range: 1.26 - 1.70 RI; 0 - 95% Brix |                       |
| - Accuracy: 0.00004 RI; 0.03 Brix          |                       |
| - Electronic Temperature Control: Flexible temperature selection between 15°C - 100°C; TB option: allows 15°C - 110°C with one hour boost to 120°C |                       |

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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 pharmacopoeias. Many of these pharmacopoeias 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. For 21CFR Part 11 compliance choose MMC option.

**Official Monographs, USP 31 / Sevoflurane**

*Sevoflurane*

\[ \text{C}_4\text{H}_3\text{F}_7\text{O} \quad 200.05 \]

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
Petroleum

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

Feature Highlight
The Rudolph Research Analytical 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.

However, there are still applications where temperatures above 100°C are needed. To accommodate the need to measure above 100°C, the Temperature Boost (TB) option was developed for the J357 Refractometer Series.

The J57WR-UF-SP is often combined with Rudolph’s density meter for automated measure of petroleum fuels, oil and waxes. Combining a refractometer with an ECS autosampler eliminates the need for manual loading.

<table>
<thead>
<tr>
<th>Models</th>
<th>Specifications</th>
<th>Features and Benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td>J57WR-UF-SP</td>
<td>- Measurement Range: 1.26 - 1.7 RI; 0 - 95% Brix</td>
<td>The J57WR-UF-SP is often combined with Rudolph’s density meter for automated measure of petroleum fuels, oil and waxes. Combining a refractometer with an ECS autosampler eliminates the need for manual loading.</td>
</tr>
<tr>
<td></td>
<td>- Accuracy: 0.0001 RI; 0.1 Brix</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Electronic Temperature Control: Fixed temperature selection: 20°C and 25°C</td>
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</tbody>
</table>

J357-NDS-CC

<table>
<thead>
<tr>
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<th>Specifications</th>
<th>Features and Benefits</th>
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<tr>
<td></td>
<td>- Measurement Range: 1.26 - 1.70 RI; 0 - 95% Brix</td>
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<tr>
<td></td>
<td>- Accuracy: 0.00004 RI; 0.03 Brix</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Electronic Temperature Control: Flexible temperature selection between 15°C - 100°C; TB option: allows 15°C - 110°C with one hour boost to 120°C</td>
<td>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. The J357-NDS 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 a sample, meeting the needs of all the ASTM standards. For added flexibility for cloud points occurring closer to 120°C select the TB option. Please contact the factory for help with this option.</td>
</tr>
</tbody>
</table>
### Models

<table>
<thead>
<tr>
<th>Models</th>
<th>Specifications</th>
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</tr>
</thead>
</table>
| J57WR   | • Measurement Range: 1.26 - 1.70 RI; 0 - 95% Brix  
          • Accuracy: 0.0001 RI; 0.1 Brix  
          • Electronic Temperature Control: Fixed temperature selection: 20°C and 25°C  | Many aromatic substances such as Cinnamic/Aldehyde have refractive indices above 1.60 RI. For this reason, most flavor/fragrance labs choose a wide RI range refractometer like the J57WR. |
| J57WR UF-SP | • Measurement Range: 1.26 - 1.70 RI; 0 - 95% Brix  
               • Accuracy: 0.0001 RI; 0.1 Brix  
               • Electronic Temperature Control: Fixed temperature selection: 20°C and 25°C  | Excellent model for the flavor and fragrance industries. Designed to be used with automation. Not suitable for waxes or VERY high viscosity samples. Seen above in combination with optical rotation, density/SG and color. |
| J257    | • Measurement Range: 1.26 - 1.70 RI; 0 - 95% Brix  
          • Accuracy: 0.0001 RI; 0.1 Brix  
          • Electronic Temperature Control: Flexible temperature selection between 15°C - 70°C  | This is our most popular stand alone model for the flavor/fragrance industry. Its wide RI range 1.2 - 1.7 measures all known products. Its non-contact sample cover improves performance for evaporative samples. Presser can be upgraded to allow automation in the future. |
| J357    | • Measurement Range: 1.26 - 1.70 RI; 0 - 95% Brix  
          • Accuracy: 0.00004 RI; 0.03 Brix  
          • Electronic Temperature Control: Flexible temperature selection between 15°C - 100°C  | More accuracy and features generally needed by the industry. This model is sometimes chosen when the customer sells most of their product to the pharmaceutical industry and wants 21CFR Part 11 compliance. |
## Model Comparison Chart: Standard Food Refractive Index Range Applications

<table>
<thead>
<tr>
<th>Specifications</th>
<th>J57HA</th>
<th>J57-HA-UF-SP</th>
<th>J57TPN</th>
<th>J157-CC</th>
<th>J157PTW</th>
<th>J157KVP</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Measurement Range</strong></td>
<td>1.33 - 1.53 RI, 0 - 95% Brix, 1.0000 - 1.0400 Urine SG</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Measurement Scales</strong></td>
<td>Refractive Index (RI) Brix (% sucrose), Temperature Corrected Brix, Temperature Corrected RI, Urine SG</td>
<td>Refractive Index (RI) Brix (% sucrose), Temperature Corrected Brix, Temperature Corrected RI, Urine SG and 100 User Programmable Scales</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Resolution</strong></td>
<td>0.00001 RI, 0.01 Brix, 0.0001 Urine SG</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td><strong>Reproducibility</strong></td>
<td>±0.00002 RI, ±0.015 Brix, ±0.0001 Urine SG</td>
<td></td>
<td></td>
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<td></td>
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</tr>
<tr>
<td><strong>Accuracy</strong></td>
<td>±0.00002 RI, ±0.02 Brix, 0.0001 Urine SG</td>
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</tr>
<tr>
<td><strong>Control Temperature</strong></td>
<td>20ºC and 25ºC</td>
<td>15ºC to 50ºC</td>
<td>15ºC to 40ºC</td>
<td>15ºC to 30ºC</td>
<td></td>
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</tr>
<tr>
<td><strong>Ambient Temperature Limit</strong></td>
<td>10ºC to 40ºC</td>
<td></td>
<td></td>
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</tr>
<tr>
<td><strong>Sample Temperature Limit</strong></td>
<td>-20ºC to +250ºC</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td><strong>Temperature Correction Range</strong></td>
<td>18 to 95ºC (for pure sucrose)</td>
<td></td>
<td></td>
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</tr>
<tr>
<td><strong>Wavelength</strong></td>
<td>589.3nm (other wavelengths available)</td>
<td></td>
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</tr>
<tr>
<td><strong>Light Source</strong></td>
<td>Light Emitting Diode (exp life&gt;1,000,000 measurements)</td>
<td></td>
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<tr>
<td><strong>Calibration</strong></td>
<td>1, 2 or 10 point using water or NIST traceable standards</td>
<td></td>
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<tr>
<td><strong>Communication Interface</strong></td>
<td>2 RS232 ports, 1 parallel port, 1 auxiliary port and USB adaptor available</td>
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<tr>
<td><strong>Models Options</strong></td>
<td>J57HA</td>
<td>J57-HA-UF-SP</td>
<td>J57TPN</td>
<td>J157-CC</td>
<td>J157PTW</td>
<td>J157KVP</td>
</tr>
<tr>
<td>Concave Cover</td>
<td>CC Option Standard</td>
<td>CP Option Standard</td>
<td>AM Option Available</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No Sample Contact</td>
<td>Not Available</td>
<td>Not Available</td>
<td>Not Available</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Contact Sample Presser</td>
<td>H Option Available</td>
<td>H Option Available</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Automeasure Feature</td>
<td>Not Available</td>
<td>Uf-SP Option Available</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Hastelloy Feature</td>
<td>Not Available</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Small Volume Sample Well (100 μ liters)</td>
<td>SV Option Available</td>
<td>SV Option Available</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Micro Flow Cell With Sealed Prism</td>
<td>Not Available</td>
<td>UF-SP Option Available</td>
<td>Not Available</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Pour In Options</td>
<td>Not Available</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Data Storage</td>
<td>Not Available</td>
<td>MMC Option Available</td>
<td>Not Available</td>
<td></td>
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</tr>
</tbody>
</table>

**Models Options**

- J57HA
- J57-HA-UF-SP
- J57TPN
- J157-CC
- J157PTW
- J157KVP

**Specifications**

- **Measurement Range**
  - J57HA: 1.33 - 1.53 RI, 0 - 95% Brix, 1.0000 - 1.0400 Urine SG
  - J57-HA-UF-SP: Refractive Index (RI) Brix (% sucrose), Temperature Corrected Brix, Temperature Corrected RI, Urine SG
  - J57TPN: Refractive Index (RI) Brix (% sucrose), Temperature Corrected Brix, Temperature Corrected RI, Urine SG and 100 User Programmable Scales
  - J157-CC: Not available
  - J157PTW: Not available
  - J157KVP: Not available

- **Resolution**
  - J57HA: 0.00001 RI, 0.01 Brix, 0.0001 Urine SG
  - J57-HA-UF-SP: Not available
  - J57TPN: Not available
  - J157-CC: Not available
  - J157PTW: Not available
  - J157KVP: Not available

- **Reproducibility**
  - J57HA: ±0.00002 RI, ±0.015 Brix, ±0.0001 Urine SG
  - J57-HA-UF-SP: Not available
  - J57TPN: Not available
  - J157-CC: Not available
  - J157PTW: Not available
  - J157KVP: Not available

- **Accuracy**
  - J57HA: ±0.00002 RI, ±0.02 Brix, 0.0001 Urine SG
  - J57-HA-UF-SP: Not available
  - J57TPN: Not available
  - J157-CC: Not available
  - J157PTW: Not available
  - J157KVP: Not available

- **Control Temperature**
  - J57HA: 20ºC and 25ºC
  - J57-HA-UF-SP: 15ºC to 50ºC
  - J57TPN: 15ºC to 40ºC
  - J157-CC: 15ºC to 30ºC

- **Ambient Temperature Limit**
  - J57HA: 10ºC to 40ºC
  - J57-HA-UF-SP: Not available
  - J57TPN: Not available
  - J157-CC: Not available
  - J157PTW: Not available
  - J157KVP: Not available

- **Sample Temperature Limit**
  - J57HA: -20ºC to +250ºC
  - J57-HA-UF-SP: Not available
  - J57TPN: Not available
  - J157-CC: Not available
  - J157PTW: Not available
  - J157KVP: Not available

- **Temperature Correction Range**
  - J57HA: 18 to 95ºC (for pure sucrose)
  - J57-HA-UF-SP: Not available
  - J57TPN: Not available
  - J157-CC: Not available
  - J157PTW: Not available
  - J157KVP: Not available

- **Wavelength**
  - J57HA: 589.3nm (other wavelengths available)
  - J57-HA-UF-SP: Not available
  - J57TPN: Not available
  - J157-CC: Not available
  - J157PTW: Not available
  - J157KVP: Not available

- **Light Source**
  - J57HA: Light Emitting Diode (exp life>1,000,000 measurements)
  - J57-HA-UF-SP: Not available
  - J57TPN: Not available
  - J157-CC: Not available
  - J157PTW: Not available
  - J157KVP: Not available

- **Calibration**
  - J57HA: 1, 2 or 10 point using water or NIST traceable standards
  - J57-HA-UF-SP: Not available
  - J57TPN: Not available
  - J157-CC: Not available
  - J157PTW: Not available
  - J157KVP: Not available

- **Communication Interface**
  - J57HA: 2 RS232 ports, 1 parallel port, 1 auxiliary port and USB adaptor available
  - J57-HA-UF-SP: Not available
  - J57TPN: Not available
  - J157-CC: Not available
  - J157PTW: Not available
  - J157KVP: Not available
# Model Comparison Chart: Wide Refractive Index Range Applications

<table>
<thead>
<tr>
<th>Specifications</th>
<th>J57WR</th>
<th>J57WR-UF-SP</th>
<th>J257-CC</th>
<th>J357-NDS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Measurement Range</strong></td>
<td>1.26 - 1.70 RI, 0 - 95% Brix</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Measurement Scales</strong></td>
<td>Refractive Index (RI) Brix (% sucrose)</td>
<td>Refractive Index (RI) Brix (% sucrose)</td>
<td>100 User Programmable Scales</td>
<td></td>
</tr>
<tr>
<td><strong>Resolution</strong></td>
<td>0.0001 RI, 0.01 Brix</td>
<td>0.0001 RI, 0.01 Brix</td>
<td>0.00001 RI, 0.01 Brix</td>
<td></td>
</tr>
<tr>
<td><strong>Reproducibility</strong></td>
<td>±0.0001 RI, ±0.1 Brix</td>
<td>±0.0001 RI, ±0.1 Brix</td>
<td>±0.00002 RI, ±0.015 Brix</td>
<td></td>
</tr>
<tr>
<td><strong>Accuracy</strong></td>
<td>0.0001 RI, 0.1 Brix</td>
<td>0.0001 RI, 0.1 Brix</td>
<td>0.00004 RI, 0.03 Brix</td>
<td></td>
</tr>
<tr>
<td><strong>Control Temperature</strong></td>
<td>20ºC and 25ºC</td>
<td>15ºC to 70ºC</td>
<td>15ºC to 100ºC</td>
<td></td>
</tr>
<tr>
<td><strong>Ambient Temperature Limit</strong></td>
<td>10ºC to 40ºC</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Sample Temperature Limit</strong></td>
<td>-20ºC to +250ºC</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Temperature Correction Range</strong></td>
<td>18 to 95ºC (for pure sucrose)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Wavelength</strong></td>
<td>589.3nm (other wavelengths available)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Light Source</strong></td>
<td>Light Emitting Diode (exp life&gt;1,000,000 measurements)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Calibration</strong></td>
<td>1, 2 or 10 point using water or NIST traceable standards</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Communication Interface</strong></td>
<td>2 RS232 ports, 1 parallel port, 1 auxiliary port and USB adaptor available</td>
<td></td>
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<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Options</th>
<th>J57WR</th>
<th>J57WR-UF-SP</th>
<th>J257-CC</th>
<th>J357-NDS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Concave Cover</strong></td>
<td></td>
<td></td>
<td></td>
<td>CC Option Standard</td>
</tr>
<tr>
<td>No Sample Contact</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Automeasure Feature</strong></td>
<td>Not Available</td>
<td></td>
<td>AM Option Available</td>
<td></td>
</tr>
<tr>
<td><strong>Contact Sample Presser</strong></td>
<td></td>
<td></td>
<td>CP Option Available</td>
<td></td>
</tr>
<tr>
<td><strong>Hastelloy Feature</strong></td>
<td>H Option Available</td>
<td></td>
<td>H Option Available</td>
<td></td>
</tr>
<tr>
<td>Acid Resistance</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Small Volume Sample</strong></td>
<td>SV Option Available</td>
<td></td>
<td>SV Option Available</td>
<td></td>
</tr>
<tr>
<td>Well (100 µ liters)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Temperature Boost</strong></td>
<td>Not Available</td>
<td></td>
<td>TB Option Available</td>
<td></td>
</tr>
<tr>
<td><strong>21 CFR Part 11</strong></td>
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<td></td>
<td>MMC Option Available</td>
<td></td>
</tr>
<tr>
<td>Compliance/Data Storage</td>
<td></td>
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</tbody>
</table>
Calibration Kits
Rudolph Research Analytical offers three different calibration fluid kits. Each fluid kit comes complete with NIST Traceable Certificates for each fluid.

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 (20º, 30º, 40º)
- 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
- A21752-1.516-Multi Temperature Fluid (20°C, 30°C, 40°C)
- A21752-1.650-20 nominal RI

Toxicology Testing
A23180-USG NIST Traceable Calibration Fluids Kit
(Special version for validating 4th decimal place Urine specific gravity refractometers)
Kit consists of the following (5) NIST traceable calibration fluids (1 oz each) at the major decisions points:
- A21752-1.3330-W 1.0000 - Urine SG
- A21752-1.0010 Urine SG
- A21752-1.0030 Urine SG
- A21752-1.0200 Urine SG
- Calibration fluid above 1.0300 (nominal for calibration)

All Calibration Fluid RI values are subject to change based on availability.

Office Style (parallel) Printer
These come in two main styles:
1. Inkjet Printer  2. Laser Printer
These office style printers have the following advantages:
- Large paper size (American standard 8 1/2 x 11 inches or A4) required by cGLP/cGMP and often preferred by regulating bodies such as FDA
- Multiple readings per page
- Inexpensive replacement cost
- Easy access to consumables

Strip Impact Printer
Receipt printers have the following advantages:
- Small footprint
- Designed for rough industrial environments
- Does not use thermal paper
- Industrial product with long model life, so that the printer is often available for many years

Barcode Reader
All Rudolph refractometers can be equipped with a barcode reader. The barcode reader has flexible programming enabling it to work with various barcode standards: Code 39, Codabar, Interleaved 2 of 5, UPC-A and others.