Refractometer

RA-620/-600

- Minimum measurement in 2 seconds
- Touchscreen operation
- One of the smallest to fit in A4 size (192 x 281mm)
- Comes with KEM Refractive Index Standard Liquid
- Completely ready for use
- Short warm-up time
- Display & sound can be customized
- Easy operation & maintenace-free

ASTM : D1218
D1569
D1807
D1992
D2140
D4056
D4095
ICUMSA : GS4/3-13
SPS-3
ISO : 1743
OIML : R124

CE

KYOTO ELECTRONICS MANUFACTURING CO.,LTD.

Refractometer
RA-620/-600

Uniqueness

1 Accuracy of One of the Highest in the World

Accuracy of ±0.00002 nD (RA-620).
(Measurement conducted under standard conditions of KEM.)
Reliable measurement with repeatability of ±0.00001 nD.
Tolerance of Brix of ±0.014%.
(Calculated from accuracy of refractive index.)

2 Compact Size Benchtop Refractometer (Built-in Temperature Control)

Space-saving of A4 Size, Two-thirds of Previous Models in Size (192mm×281mm)
(Comparison with previous models.)
Half of previous models in weight with aluminum die casting housing.
Can be installed anywhere in a limited space of lab.

3 Quick Measurement

Refractive index, Brix or concentration obtained in a short time: 2 sec. in the shortest.
(When limit time is set to 2 sec.)

4 Comes with Refractive Index Standard Liquid (Pure Water)

KEM is the only manufacturer of refractometers that also produces the standard liquids.
Can be used to evaluate reliability.

5 Image of Critical Angle

An image of the Abbe measurement scale can be viewed.

Features

4.7-inch TFT Colour LCD & Touch Screen Operation

Normal Mode

Simple Mode

Easy view of various info.
Straightforward &
user-friendly operation.
Display colours
can be changed.

Sample Cover Equipped with Anti Volatilization Device

Anti Volatilization Device
Furnished on back side of sample cover to prevent sample liquid from volatilizing.

Splash Prevention
Sample cover, when opened, prevents sample from being splashed on LCD.

Secure Measurement
Start button will not be activated when sample cover remains open.

Wide Range of Temperature Control

Temperature control range of 5~75°C.
Suitable for measurement of high-melting-point petroleum or oil and fat.
(Lower limit subject to ambient temperatures.)

Easy to Clean Sample Stage

Easy operation with sample stage at the front.

Calibration Navigator

Convenient and easy-to-follow navigator for calibration.

Indicator

Concentration range can visually be recognized.

Equipped with USB Port

For data save and transfer to PC.
(Saved in a CSV file.)

LAN & Browser Controls

Easy connection to PC with LAN.
Control and data transfer possible through browser in your PC.
No special software required.

Conversion to Concentration

Up to 100 conversion tables can be stored.

Application

Food & Beverages

To check Brix.

- Honey
- Starch syrup
- Liquid sugar
- Isomerized sugar
- Glucose
- Sweeteners
- Beet sugar
- Jam, marmalade
- Fat & oil
- Cooking oil
- Cottonseed oil
- Sesame oil
- Canola oil
- Olive oil
- Palm oil
- Coconut oil
- Condiments & seasonings
- Ketchup
- Vinegar
- Purée
- Soy sauce
- Alcoholic drinks
- Beer
- Wine
- Japanese sake (rice wine)
- Whisky
- Soft drinks
- Carbonated drinks
- Fruit drinks
- Coffee drinks
- English tea
- Milk
- Soy milk
- Lactic acid drinks
- Fruits
- Oranges
- Grapes
- Pears
- Watermelons
- Melons
- Lemons
- Apples
- Grapefruit
- Pineapples
- Peaches
- Limes
- Tomatoes

Standards

ICUMSA : GS4/3-13
SPS-3
ISO : 1743
OIML : R124

Petroleum, Chemicals

To check concentration.

- Light oil
- Kerosene
- Gasoline
- Cyclohexane
- Styrene
- Benzene
- Toluene
- Xylene
- Quenching oils
- Cutting oils (cutting fluids)
- Lubricants
- Water-soluble lubricants
- Insulating oils
- Water-soluble hydraulic oils
- Water-soluble metal working oils
- Rust preventive oils
- Antifreeze
- Ethylene glycol
- Propylene glycol
- Surfactants
- Water-soluble quenching oils
- Electronic components

Standards

ASTM: D1218
D1569
D1807
D1992
D2140
D4056
D4095

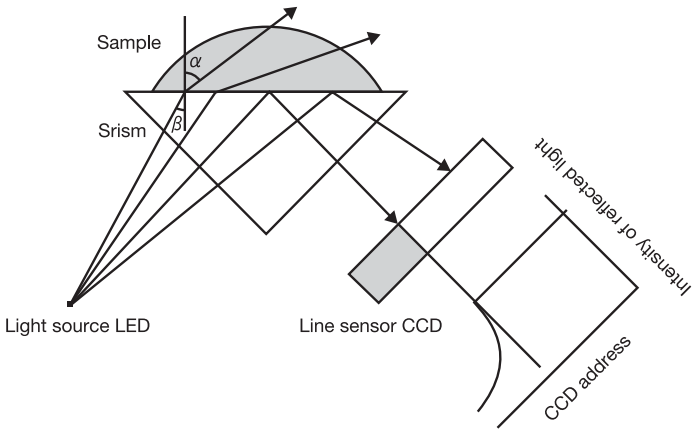
Pharmaceuticals, Flavours & Fragrances, Cosmetics

To check concentration.

- Injection solutions
- Chinese herbal remedy
- Eyedrops
- Toiletries
- Shampoos
- Hair conditioners
- Detergents
- Skin toner
- Hair tonic
- Medical services
- Serum
- Urine
- Ascites
- Body fluids
- Disinfectants
- Ethyl alcohol
- Hydrogen peroxide

Principle of Measurement of Refractive Index

Any visible light changes its direction when it passes through a material with a higher refractive index (RI) to that with a lower refractive index. As the incident ray ? increases, the refractive angle ? will increase in accordance with Snell's Law, and when the refractive angle ? reaches the critical angle (=90°), total refraction will occur at the boundary between the prism and the sample.
In actual measurements by our Refractometers, the light source, the prism (nD=1.768) and the line sensor CCD are placed as shown in the right figure, and the refractive index can be determined from the CCD address of the boundary (critical angle) between the "light" and "dark" area on the line sensor by detecting the intensity of the reflected light with the CCD sensor.



Quick Reference

1 Wipe the sample stage and the prism to clean them.

Remaining samples or some other stuff on the sample stage or the prism may prevent you from conducting an accurate measurement.

2 Drop a sufficient amount of sample on the prism to cover it entirely.

The minimum amount required is approx. 0.2mL.
A small amount of sample may result in inaccurate measurement with some samples.
Meanwhile, too much sample liquid would make it longer to adjust the temperature and to complete the measurement.

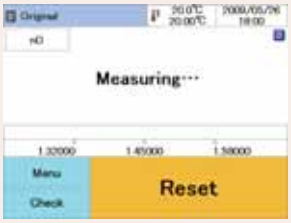
3 Close the sample cover.

Make sure to close the sample cover.
It is important to do so to block the exterior light and to achieve an accurate measurement.

4 Press “Start” .

5 Measuring...

“Start” changes to “Reset” once a measurement has started.
Press “Reset” if you wish to stop the measurement.



6 A measurement result appears.

Immediately wipe off the sample after measurement and clean the prism and the sample stage.
Leaving the sample there for a long time may make it difficult to clean the prism and the sample stage.

FAQ

1 Q What are the features of RA-620/-600?

A State-of-the-art design that cannot be seen with past models, and user-friendly operation, even suitable for the first-time users.

2 Q What is the sample amount required?

A A sample of 0.2mL or more is required.

3 Q How long does it take to measure one sample?

A Minimum two (2) seconds. (May vary according to samples and ambient conditions.)

4 Q What should I do after a measurement?

A If the sample is an aqueous solution, wipe it off with water and ethanol using tissues or a soft cloth.
If the sample is an organic solvent such as toluene, wipe it off with ethanol or acetone.

5 Q Are there any consumables?

A Nothing special. We recommend, however, that the dustproof filter be cleaned every one to two months.
If dust persists, replace the filter. (P/N 12-01576-00-48 Filter Set (10 filters/set))

6 Q How can I check the measurement accuracy?

A We recommend that our Refractive Index Standard Liquids be used to check the accuracy.

Options

Sampler

Auto Cleaning and Sampling Unit DCU-551N

- Very convenient with samples of flavours/fragrances or drug materials.
- Capable of viscous samples up to 30,000mPa・s.
- Measurement of one sample only in a 20mL vial.
- Connecting cable included.

Multiple Sample Changer CHD-502N

- Automatically cleans and drys measurement cell and connecting tubes.
- Capable of viscous samples up to 30,000mPa・s.
- Measurement of up to 30 samples in 20mL vials.
- Connecting cable included.

Printer

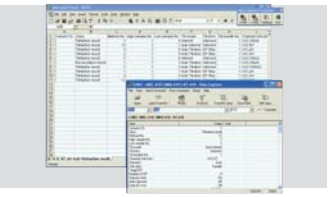
Thermal Printer DP-600

Dot Matrix Printer IDP-100

Software

SOFT-CAP Data Capture Software

- Data transfer to your PC in a CSV file.



Standard Liquid

Refractive Index Standard Liquids

Optional Refractive Index Standard Liquid

KEM is the only manufacturer of refractometers that also produces the standard liquids.

Part Name	Part Code	nD at 20°C	Note (2 bottles per set)
Pure Water	61-001-0200-48	1.33299	One set of 2 bottles
Isooctane	61-001-0300-48	1.391**	Set of pure water and isooctane
Cyclohexane	61-001-0400-48	1.426**	Set of pure water and cyclohexane
Dichlorotoluene	61-001-2200-48	1.546**	Set of pure water and dichlorotoluene
Dibenzyl ether	61-001-0600-48	1.563**	Set of pure water and dibenzyl ether
1-Bromonaphthalane*1	61-001-0700-48	1.658**	Set of pure water and 1-bromonaphthalene

*1-Bromonaphthalane is out of range of measurement for RA-620.

Brix Converted Standard Liquid of Refractive Index

Part Name	Part Code	Brix% nD at 20°C	Note (2 bottles per set)
5 Brix solution	61-001-1100-48	5.** Brix% 1.340**	Equivalent to 5 Brix% One set of 2 bottles
10 Brix solution	61-001-1200-48	10.** Brix% 1.347**	Equivalent to 10 Brix% One set of 2 bottles

Recommend Consumables and Parts

Part Name	Part Code	Note
Printer Roll (4rolls)	98-829-0001S	For IDP-100 Dot Matrix Printer
Ribbon cartridge	98-829-0054	Black, For IDP-100 Dot Matrix Printer
Ribbon cartridge	98-829-0054S	5pcs/set Black, For IDP-100 Dot Matrix Printer
Thermal Paper Roll (10rolls)	69-00522-11-48	For DP-600 Thermal Printer
Filter Set	12-01576-00-48	10 filters/set

Standard Parts

Part Name	Part Number	Quantity
Main Unit	RA-620 or RA-600	1 unit
AC Adapter	- *1	1 set
Stylus	69-00444-00-48	1 piece
Pure Water (set of two Refractive Index Standard Liquids)	61-001-0200-48	1 set
Operation Manual	69-00462-01-48	1 copy
Function Description	69-00463-01-48	1 copy
Quick Manual	69-00464-01-48	1 copy
Warranty	-	1 copy

*1 : Varies by power supply requirement

		RA-620	RA-600
Measuring Method		Detection of Critical Angle of Optical Refraction	
Light Source		LED Na-D Line (589.3nm)	
Measuring Items		Refractive Index, Brix, Other Concentrations	
Measuring Range	Refractive Index (nD)	1.32000 ~ 1.58000	1.3200 ~ 1.7000
	Brix	0.00 ~ 100.00%	
Accuracy *1	Refractive Index (nD)	±0.00002	±0.0001
	Brix	±0.014% *2 (0 ~ 85.0%)	±0.1%
Repeatability *3	Refractive Index (nD)	±0.00001	±0.0001
	Brix	±0.007% (<5%) ±0.01% (≧5%)	±0.1%
Resolution	Refractive Index (nD)	0.00001	0.0001
	Brix	0.001% (<5%) 0.01% (≧5%)	0.1%
Temperature Control		Peltier Thermostat 5°C ~ 75°C*4	
Temperature Indication Resolution		0.01°C	0.1°C
Minimum Amount of Sample		0.2mL	
Display		4.7-inch TFT	
Operation		Touchscreen (Comes with Stylus.)	
Security		Password Protection	
Data Storage	Number of Methods	100 methods	
	Measurement Results	300 data	
	Calibration Record	20 data	
	Check Record	20 data	
	External Storage	USB Flash Drive	
Temp. Compensation		5.00 ~ 75.00°C (Automatic compensation by preprogrammed conversion table.)	
Concentration	By Conversion Table	100 data	
Interfaces	LAN	1 port for personal computer (PC)	
	USB1.1	2 ports (for USB flash drive, A4-size printer, barcode reader, keyboard)	
	RS-232C	2 ports (for IDP-100, multiple sample changer)	
Ambient Conditions	Temperature	5 ~ 35°C	
	Humidity	85%RH or below (No condensation allowed.)	
Power Supply		AC 100 ~ 240V, 50/60Hz (Comes with AC adapter.)	
Power Consumption		20W (max. 50W, min. 10W)	
Dimensions		192 (W) × 281 (D) × 166 (H) mm	
Weight		5kg	
Export Packing in Double Carton Box		G/W 9.1kg 560 (W) x 460 (D) x 330 (H)mm (May vary in some cases.)	
Materials in Contact with Samples	Prism	Artificial Sapphire	
	Sample Stage	SUS316	
Option	Printer	DP-600, IDP-100	
	Sampler	DCU-551N, CHD-502N	
	Software	SOFT-CAP	
Expandability	Barcode Reader	Reads sample name, measurement conditions, value of standard liquid	
	PC Software	Data Acquisition Software	

*1 : By KEM' s standard measurement conditions. *2 : From RI accuracy of results.
*3 : By KEM' s standard measurement conditions. Subject to sample properties. *4 : Lower limit 12°C below ambient.

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