Density/Specific Gravity Meter

DA-650/-645/-640

- Quickest measurement in 20 seconds
- Minimum sample of 1 mL
- Viscosity correction for high-viscosity samples
- Touchscreen operation
- Comes with KEM Density Standard Liquid
- Equipped with sampling & dry pump
- Completely ready for use
- Customizable display & sound
- Easy operation & maintenance-free

ASTM	D 1250
	D 1475
	D 4052
	D 4806
	D 5002
	D 5798
	D 5931
ISO	12185
ISO	15212
Pharmacopoeia	

CE

KEM
KYOTO ELECTRONICS MANUFACTURING CO.,LTD.

Density/Specific Gravity Meter
DA-650/-645/-640

Uniqueness

1 Accuracy of One of the Highest in the World

Density: ±2x10-5g/cm3
Repeatability: SD 5x10-6g/cm3
Temp.: ±0.02°C (10~30°C)
(DA-650 Specs)

2 Quick Measurement

Quickest measurement in 20 sec.
(When temp. is stable.)
※By standard conditions of KEM.

3 Small Sample Size

Minimum sample of 1 mL is enough.
(Manual sampling.)

4 Viscosity Correction for High-viscosity Samples

Capable of up to 30,000mPa･s.
(Manual sampling: 30,000mPa･s,
Sampling with pump: 1,000mPa･s)

5 Comes with Density Standard Liquid

KEM is the only manufacturer of density/specific gravity meters that also produces the density standard liquids. With our own standard liquids, high quality and high reliability are guaranteed.

Features

Equipped with sampling and dry pump

Hassle-free measurement. You are free from contact with samples.

Easy to check measurement cell

High brightness white LED brings much more improved visibility in the cell window.
Easy to check the measuring cell.

No air bubbles, no contamination

Introducing completely new flat-type joint for almost no air bubbles and no contamination.
Less cleaning leads to cost reduction.

One-point calibration mode

Calibration at one temperature is enough.
This mode enables measurement at temperatures with no calibration.

Convenient preprogrammed methods

Several standard methods (measurement conditions) are preprogrammed for popular samples.
No worry about hectic parameter settings.
Useful at petrochemical and food industries.

Equipped with USB & LAN ports

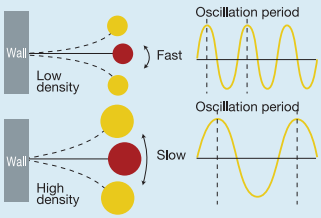
Easy connection to your PC through LAN.
Easy transfer of measurement data to your PC with USB flash drive (in CSV format).
Keyboard can also be connected.

Application

Crude Oil, Petrochemical Products, Biofuels		
ASTM D 1250, D 1475, D 4052, D 4806, D 5002, D 5798, D 5931 ISO 12185, 15212	Density, SG	Market price and tax amount are subject to density or SG of oil products such as crude oil, fuels (heavy oil, light oil, kerosene and gasoline) and lubricants.
Chemical Products		
	Concentration	Various chemical products are measured for quality control purposes during production process and/or before shipment. Organic and inorganic substances are controlled by purity or by concentration,
Beverage		
	Brix, Density	Samples in this category include milk, dairy products, soft drinks, carbonated drinks, fruit juice, soy milk, etc. Density or Brix is measured for quality control purposes during production process and/or before shipment.
Alcoholic Drinks		
	Alcohol Concentration	Samples in this category include beer, wine, whisky, Japanese sake and other liquors. Pricing is subject to alcohol concentration or extract, and taxation subject to alcohol degree.
Food		
	Brix, Concentration	Samples in this category include raw materials such as honey, syrup, concentrated extract, saline water, isomerized sugar, etc. Soy sauce, Worcestershire sauce or barbeque sauce is checked for taste control by measuring Brix or concentration of target substance.
Fat and Oil		
	Density, SG	Quality of vegetable oil and animal oil are controlled by measuring density or SG.
Fragrance, Pharmaceutical		
	Density	Samples in this category are precious and expensive. Even with a limited amount of sample, successful measurement can be done easily and conveniently.
Electronic Parts, Semiconductors		
	Density	Quality control is required by measuring density of surface processing fluids like etching or acid cleaning.
Electric		
	Concentration, Density	Concentration of flux or density of plating fluid is checked for quality control purposes in the manufacturing process.

Measurement Principle

Just imagine the model where a weight is attached to a bar at the end and a bar is fixed on a wall as shown in the right figures. And when you hit the weight by a finger, the weight starts vibrating. Now you will find that the heavier the weight becomes, the slower it vibrates, and vice versa. This is because the weight will vibrate on the oscillation period specific to a substance in proportion to the mass of weight. This means that one can determine the density of a substance by measuring its oscillation period since density becomes proportional to the mass when the volume is constant, i.e. a fixed tube.



FAQs

1 What is sample amount required ???

A sample of 1mLor more is required.

2 How long does it take to measure one sample ??

Minimum 20 seconds. (May vary according to samples and ambient conditions.)

3 How often is calibration required?

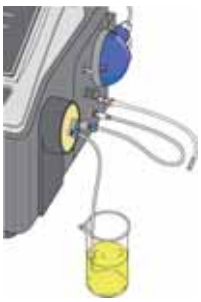
Factor calibration must be made before any measurement is attempted right after the unit is turned on. If the unit is left turned on, calibration must be made once every three days. The necessity of calibration can be confirmed by comparing the measured results of calibration with air and water. If the result is the same as before, it means that calibration is not necessary.

4 What solutions are recommended to clean and dry the measuring cell?

Sample	Solution 1 (To Clean)	Solution 2 (To Dry)
Petrochemical Product / Organic Substance	Toluene	Acetone
Soft Drink / Alcohol	Pure Water	Acetone or Ethanol
Protein Substance	Hypochlorous Acid	Pure Water or Ethanol

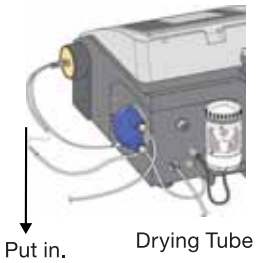
Quick Reference

1 Clean the cell



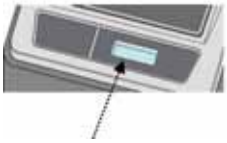
- Adjust sample/drainlever to “Drain.”
- Wipe off tip of sampling tube.
- Press “PUMP” and clean the cell with rinse solution 2 forabout 10 sec.
- Press “PUMP” to stop pump operation.

2 Dry the cell



- Wipe off sampling tube and put it in drying tube.
- Press “PURGE” twice. (Auto Off)

3 Sampling



Check air bubbles.

- Adjust sample/drain lever to “Sample.”
- Adjust controller to slowest.
- Press “PUMP” to start sampling.
- Adjust controller to optimal speed.
- Check through cell window to make sure there is no air bubble in the cell.
- Press “PUMP” to stop pump operation.

4 Start measurement

- Press “START”.

5 Measurement ends

- Once oscillation frequency becomes stable, measurement comes to an end and result (density of sample) will be shown

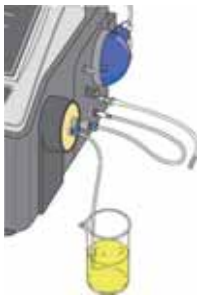
6 Drain sample

- Adjust sample/drain lever to “Drain.”
- Remove sampling tube from sample.
- Press “PUMP” to drain sample.

7 Clean the cell (Rinse 1)

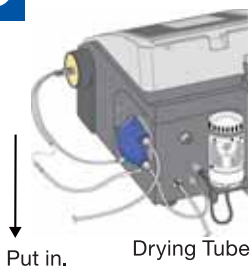
- Adjust sample/drain lever to “Drain.”
- Wipe off tip of sampling tube.
- Press “PUMP” and clean the cell with rinse solution 1 for about 10 sec.
- Press “PUMP” to stop pump operation.

8 Clean the cell (Rinse 2)



- Adjust sample/drain lever to “Drain.”
- Wipe off tip of sampling tube.
- Press “PUMP” and clean the cell with rinse solution 2 for about 10 sec.
- Press “PUMP” to stop pump operation.

9 Dry the cell



- Wipe off sampling tube and put it in drying tube.
- Press “PURGE” twice. (Auto Off)

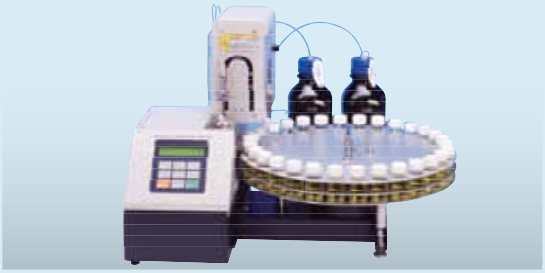
Options

Sampler for Time-saving

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

- Cable 64-00625-00-48 required.

Dot Matrix Printer IDP-100

- Cable 64-00625-00-48 required.

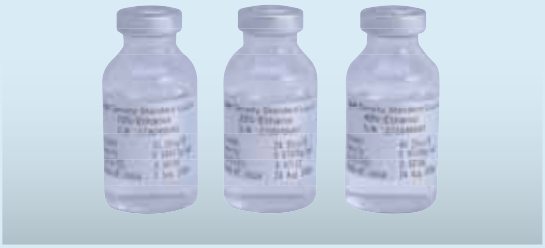
Software

SOFT-CAP Data Capture Software

- Data transfer to your PC in a CSV file.

Standard Liquid

Density Standard Liquid



3-place Density Meter

DA-100 Density/Specific Gravity Meter

- Measurement Range: 0 ~ 3 g/cm3
- Measurement temperature: 15 ~ 40 °C (59 ~ 104 °F)
- Accuracy of density: ±0.001g/cm3

Concentration Meter

WBA-505/-504 General Concentration Meter

- Measurement of density and refractive index with one equipment.
  No separate instruments required. You can save your precious samples.

JCSS-accredited Density Standard Liquid

Part Name	Part Number	g/cm³ at 20°C	Volume	Remarks
Pure Water	98-811-0076	0.99821	10mL	2 bottles/set
Isooctane	98-811-0077	0.691**	10mL	Pure Water and Isooctane (one bottle each)
Dichlorotoluene	98-811-0078	1.249**	10mL	Pure Water and Dichlorotoluene (one bottle each)
Bromobenzene	98-811-0079	1.494**	10mL	Pure Water and Bromobenzene (one bottle each)
15% ethanol	61-00020-00-48	0.980**	20mL	3 bottles/set
25% ethanol	61-00021-00-48	0.970**	20mL	3 bottles/set
40% ethanol	61-00022-00-48	0.948**	20mL	3 bottles/set

* Shelf life is 1 year except for Bromobenzene of 6-month.

Recommend Consumables and Parts

Part Name	Part Number	Qty	Remarks
Filter	20-05665-00-48	1 pc	
Silica Gel (500g)	61-00249-00-48	1 pc	
Syringe	66-00088-00-48	2 pcs	2 mL
Thermal Print Roll (10 rolls/set)	69-00522-01-48	1 set	For Thermal Printer
Thermal print paper roll (longer life) (10 rolls/set)	69-00522-11-48	1 set	For Thermal Printer

Standard Parts

Part Name	Part Number	Qty	Note
Main unit	DA-650/DA-645/DA-640	1 unit	
Tube Holder	12-00051-00-48	1 pc	
Desiccant	12-01148-02-48	1 pc	
Connecting Tube	12-01997-01-48	1 pc	For Drain (Solenoid Side)
Connecting Tube	12-01998-00-48	1 pc	For Drying
Connecting Tube	12-01999-00-48	1 pc	For Drain (Cell Outlet Side)
Connecting Tube	12-02000-00-48	1 pc	For Sampling
Connecting Tube	12-02699-00-48	1 pc	For Purge Gas
Lure Adapter	20-05764-00-48	1 pc	Adapter for Syringe
Darin Tube	20-05789-01-48	1 pc	For Drain (Pump Side)
Operation Manual CD-ROM	12-02845-00-48	1 copy	
Quick Manual	59-00053-01-48	1 copy	
Silica Gel (500g)	61-00249-00-48	1 pc	
Syringe	66-00088-00-48	2 pcs	2 mL
Stylus	69-00444-00-48	1 pc	
Pure Water	-	1 set	Density Standard Liquid (2 bottles)
Warranty Card	-	1 copy	
Inspection Slip	-	1 copy	

Model Name		DA-650	DA-645	DA-640
Measurement Method		Resonant frequency oscillation		
Measurement Range		0 ~ 3 g/cm³		
Measurement Temp Range		0 ~ 90 °C (32 ~ 194 °F)		
Accuracy*1	Density	±2x10⁻⁵ g/cm³ (0.00002 g/cm³)	±5x10⁻⁵ g/cm³ (0.00005 g/cm³)	±1x10⁻⁴ g/cm³ (0.0001 g/cm³)
		(Calibration with air and water required.)		
	Temp	±0.02 °C (±0.04 °F)	±0.03 °C (±0.05 °F)	±0.05 °C (±0.09 °F)
Repeatability*2	Density	SD 5x10⁻⁶ g/cm³	SD 1x10⁻⁵ g/cm³	SD 5x10⁻⁵ g/cm³
Minimum Sample Required		1) Approx. 1 mL (Syringe) 2) Approx. 2 mL (Pump)		
Measurement Time		1) 1 to 4 mins (Manual) 2) 2 to 10 mins (Auto)		
Display		1) 5.7-inch colour TFT LCD; 640 x 480 2) Shows density, specific gravity, oscillation frequency, temperature, concentration and other messages.		
Viscosity Correction		Yes		
Sampling		1) Manual by syringe 2) Auto by peristaltic pump		
Method		Saves up to 100 different methods in built-in memory.		
Stability		Four modes of stability according to measurement accuracy and time.		
Density Auto Correction		1) Saves conversion table or formula at your desired temperatures according to your samples. 2) Temperature conversion table preprogrammed according to ASTM standard for petroleum, petroleum products and lubricating oils.		
Auto Conversion		1) Between concentration and density. 2) Between temperature and density.		
Statistics		1) Auto or manual calculation of mean value, SD and coefficient.		
		2) Recalculation, data deletion.		
Interfaces		1) LAN : x 1; Personal computer (PC) 2) USB 1.1 : x 2; USB flash drive, keyboard, barcode reader, Epson inkjet printer *3 3) RS-232C : x 2; Dot Matrix Printer, Auto Clean and Sampling Unit, Multiple Sample Changer		
Options		1) Printer : DP-600, IDP-100 2) Sampling Unit, Changer : DCU-551N/H, CHD-502N/H/C 3) Software : SOFT-CAP (Data Acquisition Software)		
Data I/O		1) USB flash drive as data storage medium. 2) Application Notes provided in USB flash drive.		
Wetted Materials		PTFE, borosilicate glass, SUS304		
Ambient Conditions		1) Temperature : 5 ~ 35 °C (41 ~ 95 °F)		
		2) Humidity : 85%RH or below (No condensation allowed.)		
Power Supply		AC 100 ~ 240V; 50/60Hz (Comes with AC adapter.)		
Power Consumption		40W (max. 120W, min. 20W)		
Dimensions		320 (W) x 365 (D) x 250 (H) mm (12.6 (W) x 14.4 (D) x 9.8 (H) inches)		
Weight		18 kg (39.7 lbs)		
Export Packing in Double Carton Box		G/W 21 kg; 540 (W) x 480 (D) x 460 (H) mm (G/W 46.3 lbs; 21.3 (W) x 18.9 (D) x 18.1 (H) inches) (May vary in some cases.)		

*1, *2: According to KEM standard measurement conditions.
*3: Enquire for applicable models.

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