Automatic Potentiometric Titrator
Karl Fischer Moisture Titrator
▶ Density/Specific Gravity Meter
Refractometer
Thermal Measurement Instrument
Process & Environment

Density/Specific Gravity Meter

DA-650/-645/-640 (With viscosity correction)
DA-650B/-645B/-640B (Without viscosity correction)

- Quickest measurement in 20 seconds
- Minimum sample of 1.0 mL
- Viscosity correction for high-viscosity samples*1
- Touchscreen operation
- Comes with Density Standard Liquid
- Equipped with sampling*2 & 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

KYOTO ELECTRONICS MANUFACTURING CO.,LTD.

*1 DA-650B/-645B/-640B is not equipped with viscosity correction function. *2 Each model is also available without sampling (peristaltic) pump.

Density/Specific Gravity Meter

Uniqueness

1 Accuracy of One of the Highest in the World

Density: ±2x10^{-5}g/cm^3
(Repeatability: SD 5x10^{-6}g/cm^3)
Temp.: ±0.02°C
(DA-650/-650B)

2 Quick Measurement

20 seconds
(According to KEM standard measurement conditions)

3 Small Sample Size

Minimum 1.0mL
(Manual sampling by syringe)

4 Viscosity Correction for High-viscosity Samples*1

Up to 30,000 mPa·s
(Manual sampling by syringe: 30,000 mPa·s,
Auto sampling by peristaltic pump:1,000mPa·s)

5 Comes with Density Standard Liquid

KEM is the only manufacturer of Density/Specific Gravity Meters that also produces standard liquids.
KEM's original Density Standard Liquid guarantees high quality and reliability.

*1 DA-650B/-645B/-640B is not equipped with viscosity correction function.

Features

Hassle-free and safe measurement

Sampling*2 & dry pump makes comprehensive measurement procedure simple and prevents a sample from contacting the skin.

Easy check of measurement cell

High-intensity LED and cell window ensures high visibility inside measurement cell.

No air bubble, no contamination

New flat-type joint ensures almost no air bubble and no contamination. It contributes to easy cleaning and cost reduction.

Calibration at one temperature

One-point calibration enables measurement at different temps. from one temp. at which calibration is carried out.

Easy data transfer

USB flash drive and LAN enables data to be transferred to PC.

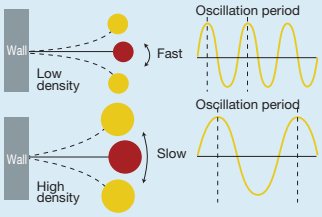
*2 Each model is also available without sampling (peristaltic) pump.

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?

Minimum 1mL is required.

2 How long does it take to measure one sample?

Minimum 20 seconds is required. (It may vary depending on samples, ambient conditions etc.)

3 How often is calibration required?

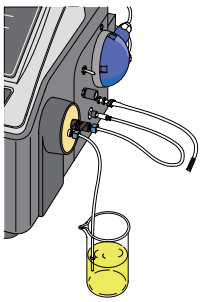
Factor calibration must be made before any measurement is attempted right after the unit is turned on. If the unit is left turned on, calibration must be made once every three days. The necessity of calibration can be confirmed by comparing the measured results of calibration with air and water. If the 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	Rinse Solution 1 (To Clean)	Rinse 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

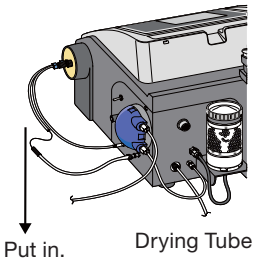
1 Clean the cell



- Adjust sample/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.

2 Dry the cell

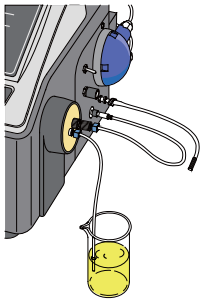
Sampling Tube

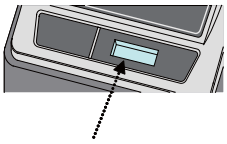


Put in. Drying Tube

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

3 Sampling

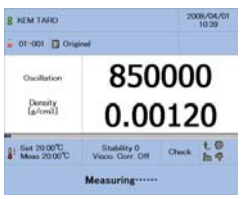




Check air bubbles.

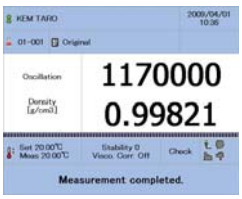
- Adjust sample/drain lever to “Sample.”
- Adjust controller to slowest.
- Press “PUMP” to start sampling.
- Adjust controller to optimal speed.
- Check through cell window to make sure there is no air bubble in the cell.
- Press “PUMP” to stop pump operation.

4 Start measurement



- Press “START”.

5 Measurement ends

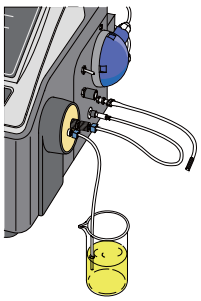


- Once oscillation frequency becomes stable, measurement comes to an end and result (density of sample) will be shown.

6 Drain sample

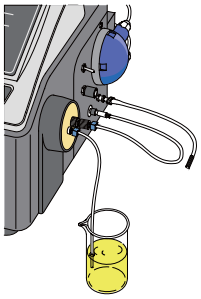
- Adjust sample/drain lever to “Drain.”
- Remove sampling tube from sample.
- Press “PUMP” to drain sample.

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.

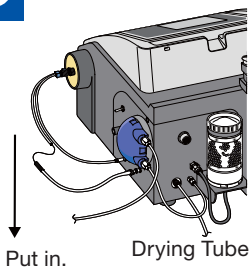
8 Clean the cell (Rinse 2)



- 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

Sampling Tube



Put in. Drying Tube

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

Options

Sampler

Auto Clean and Sampling Unit DCU-551N/H

- Measurement of 1 sample in 20mL vial
- Viscosity up to 30,000mPa･s
- Heating temp. of R.T ～ 80℃ (DCU-551H)
- Connection kit required;
  12-02763 (DCU-551N)
  12-02764 (DCU-551H)

Multiple Sample Changer CHD-502N/H/C

- Measurement of 30 samples in 20mL vial
- Viscosity up to 30,000mPa･s
- Heating temp. of R.T ～ 80℃ (CHD-502H)
- Thermostat water circulator to be locally prepared (CHD-502C)
- Connection kit required;
  12-02763 (CHD-502N/C)
  12-02764 (CHD--502H)

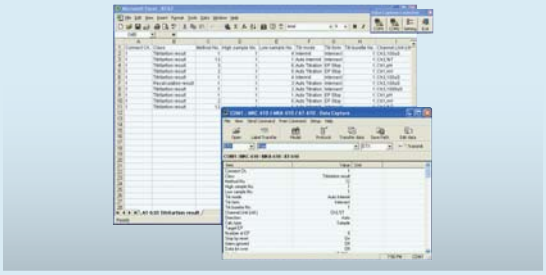
Printer

Thermal Printer with Connection Cable 12-02618-0X

Dot Matrix Printer with Connection Cable 12-02028-0X

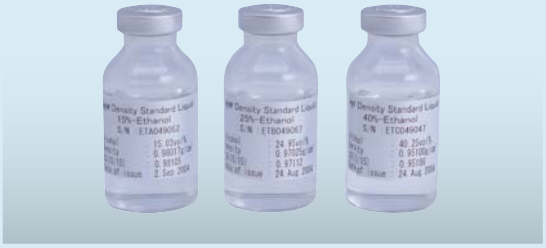
Software

Data Capture Software SOFT-CAP



- Data transfer to PC in CSV format
- Connection cable required;
  64-00625 & 12-02012

Density Standard Liquid



3-place Density Meter

Density / Specific Gravity Meter DA-100

- Measurement Range: 0 ～ 3g/cm³
- Measurement Temp.: 15 ～ 40℃ (59 ～ 104°F)
- Accuracy of Density: ±0.001g/cm³

Portable Density Meter

Portable Density / Specific Gravity Meter DA-130N

- Measurement Range: 0 ～ 2g/cm³
- Entry of Temp. Compensation Coefficient: Manual
- Accuracy of Density: ±0.001g/cm³

JCSS-accredited Density Standard Liquid

Part name	Part number	g/cm³ at 20°C	mL/bottle	Remarks
Pure Water	12-02708-01	0.99821	10	2 bottles/ set
Isooctane*1	12-03288-01	0.691**	10	Pure water & Isooctane 1 bottle each
Dichlorotoluene	12-03289-01	1.249**	10	Pure water & Dichlorotoluene 1 bottle each
Bromobenzene*1	12-03290-01	1.494**	10	Water & Bromobenzene 1 bottle each
Part name	**Part number**	**g/cm³ at 15°C**	**mL/bottle**	**Remarks**
5% ethanol	12-03536-30	0.991**	20	3 bottles/ set
10% ethanol	12-03536-31	0.985**	20	3 bottles/ set
15% ethanol	12-03536-32	0.980**	20	3 bottles/ set
20% ethanol	12-03536-33	0.975**	20	3 bottles/ set

Shelf life: 6 months from calibration date (Bromobenzene & Ethanol) / 12 months from calibration date (Others)
*1 These items are categorized as hazard items to be exported. It requires special packing & transportation charge.

Recommend Consumables and Parts

Part name	Part number	Qty	Remarks
Filter	20-05665	1 pc	
Silica Gel (500g)	61-00249	1 pc	
Syringe 2mL x 2	66-00088	1 set	
Thermal Roll Printer 10 rolls	69-00522-01	1 set	For Thermal Printer
Thermal Roll Printer 10 rolls (High quality)	69-00522-11	1 set	For Thermal Printer
Print Roll 4 rolls	98-829-0001S	1 set	For Dot Matrix Printer
Ribbon Cartridge (Black) 5 pcs	98-829-0054S	1 set	For Dot Matrix Printer

Standard Parts

Part name	Part number	Qty	Remarks
Main Unit	DA-650/DA-645/DA-640 or DA-650B/DA-645B/DA-640B	1 unit	
Tube Holder	12-00051-00	1 pc	
Desiccant Tube	12-01148-02	1 pc	
Connection Tube (For Solenoid Valve Exhaust)	12-01997-01	1 pc	
Connection Tube (For Drying)	12-01998	1 pc	
Connection Tube (For Cell Drain Outlet)	12-01999	1 pc	
Connection Tube (For Sampling)	12-02000	1 pc	
Connection Tube (For Purge)	12-02699	1 pc	
Lure Adapter	20-05764	1 pc	Adapter for syringe
Tube (For Pump Drain)	20-05789-01	1 pc	
Operation Manual (CD-ROM)	12-02845	1 pc	Incl. Operation Manual, Function Description, CE Declaration of conformity, etc.
Quick Manual	59-00053-01	1 copy	
Silica Gel (500g)	61-00249	1 pc	
AC Adapter	12-02833-0X	1 pc	
Syringe 2mL x 2	66-00088	1 set	
Touch Pen	69-00444	1 pc	
Pure Water	-	1 set	Density standard liquid (2 bottles/ set)
Inspection Certificate / Warranty	-	1 copy	

Model Name		DA-650	DA-650B	DA-645	DA-645B	DA-640	DA-640B
Measurement Method		Resonant frequency oscillation					
Measurement Range		0 ~ 3 g/cm^3					
Temperature Range		0 ~ 93 °C (32 ~ 199.4 °F)					
Accuracy*1	Density	±2x10^{-5} g/cm^3 (0.00002 g/cm^3)		±5x10^{-5} g/cm^3 (0.00005 g/cm^3)		±1x10^{-4} g/cm^3 (0.0001 g/cm^3)	
		(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/cm^3		SD 1x10^{-5} g/cm^3		SD 5x10^{-5} g/cm^3	
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	No	Yes	No	Yes	No
Sampling		1) Manual by syringe 2) Auto by sampling (peristaltic) pump*3					
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 *4 3) RS-232C : x 2; Dot Matrix Printer, Auto Clean and Sampling Unit, Multiple Sample Changer					
Options		1) Printer : Thermal Printer, Dot Matrix Printer 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 (46.3 lbs); 540 (W) 480 (D) 460 (H) mm (21.3 (W) 18.9 (D) 18.1 (H) inches) (May vary in some cases.)					

*1, *2: According to KEM standard measurement conditions.
*3: Each model is also available without sampling (peristaltic) pump.
*4: Enquire for applicable models.

KYOTO ELECTRONICS MANUFACTURING CO., LTD.
Yamawaki Bldg, 9F 4-8-21, Kudan-minami,
Chiyoda-ku, Tokyo 102-0074 Japan
TEL +81-3-3239-7333 FAX +81-3-3237-0537
www.kyoto-kem.com

Your Distributor

201203