

AUTOMATIC DENSITY GRADIENT COLUMN

DATA SHEET

Density Gradient Column is a method that enables determination of the density. The instrument permits determinations on solid materials at a temperature of 23°C (± 0.1°C), with a 0.0001 g/cm³ accuracy, within a measuring range of 0.8 ± 3.3 g/cm³, basing on the adopted marker floats at known density.



Technical features:

- Perspex bath capacity: 45 litres
- Two or three columns 850 mm length, 55 mm Ø, basing on model.
- Thermostatic unit that includes:
 - Touch screen display for control temperature (thermistor range to +50°C)
 - water inlet (at 15° ÷ 16°C)
 - water outlet
- Pump for an ellipsoid flow of thermostatic fluid into the bath
- Overall dimensions : 380 x 380 x 1580 h mm
- Weight: 93 kg
- Power supply: 230 V – 50 Hz – 2 kVA monophase

To ensure results accuracy the density Gradient apparatus is supplied with digital temperature control to ensure the temperature of each column is at 23°C. For ambient temperatures in excess of 23°C integrated cooling coil can be used in conjunction with water **Chiller unit (40380731)** so the correct temperature can be maintained.

Principle :

Marker floats at known density are immersed in the column and stop, during sinking, when their own density corresponds exactly to the density of the reached solution.

For determining the density of a sample it is therefore necessary to immerse in the same column and expect till it stops because the balance between its own density and solution density is reached. The referenced position of marker floats along the column and the steady position of the sample give the density determination of the sample. Repeated tests have demonstrated that distribution of gradient density does not vary for more than 40 weeks.



OPTICAL MICROSCOPE

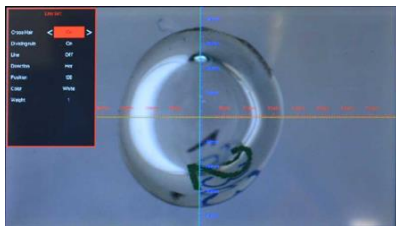


The camera to be able to read anywhere in the columns is mounted on a system of three-axis guides XYZ, on the X axis (horizontally) is free movement, that is you move the camera manually to the right and left and there is a system of sensors, which indicates to the control system during measurement, on which column it is placed.

Standards	
ASTM	D1505
ISO	1183-2



On the other hand, the vertical Y-axis movement is controlled by a screw system on ball recirculation driven by a crank, which turns it raises or lowers the camera with centesimal precision.



View of the calibrated marker float

The instrument is equipped with a motorised system for retrieving floats and samples without altering the gradient. System is to be positioned in front of to each column from which floats and samples are to be collected with the help of a glass or metal basket

AUTOMATIC GRAVITY SYSTEM(10006016)

Technical features:

For liquids filling of the columns consists of a trolley on wheels, equipped with magnetic stirrer, two conical flasks by 2000 ml with conical fitting, taps in glass, connection and interception, silicon tube and spherical ground joints to be placed on the support by the floor. The column filling system with peristaltic pumps allows automatic filling of the column by adjusting the density with high precision.

The system allows you to define the filling cm (formula: $ml = cm * 19.6$) with variable density and possibly a head and a tail with a fixed density (minimum and maximum).

- Dimensions: 600 x 450 x 1100 mm
- Weight: kg 25 (approx.)
- Power supply: 230 V – 50 Hz

The control system allows three distinct work functions defined with LOW, MIX and HIGH.

Two methods (A- B-) with one or two pumps.



Includes support with magnetic stirrer, two conical flasks with connections and silicon tube
The equipment is controlled by means of a touch screen placed on the front of the FILLING SYSTEM, the control panel allows the calibration of the pumps and the filling of the column with the set parameters.



Choice of liquids

Double-distilled water and anhydrous ethyl alcohol or other liquid appropriate to the gradient are necessary to prepare the solution.

Density g/cm ³	range	
0.85 ± 0.98		Ethanol – Water
0.85 ± 1.59		Ethanol – Carbon tetrachloride
0.98 ± 1		Ethanol/Water – Water/Potassium iodide
1 ± 1.6		Water – Potassium iodide
1.10 ± 2.6		Tetrabromo ethane – Trietilphosphate

Effect of the liquids on test specimens:

The two liquids or solution in the gradient column must not alter the test specimens by chemical reaction or by absorption, otherwise there will be errors in determining the density of the sample being tested. Many plastics are affected by the liquids used in gradient columns, and especially when testing thin films which have a high surface area to volume ratio even slight water absorption can be sufficient to give slightly erroneous results. To test if the sample is stable in the chosen liquid mixture, take a sample the same size as would be tested in the column; weigh it; soak it for 2 hours in a beaker containing some of the mixture; wipe dry; and then reweigh. If there is any change in weight after soaking, it is reasonable to assume that the sample is not stable in this mixture, and other liquids should be used in the column.

Code	Description
10006030	Two columns Density gradient
10006031	Three columns Density gradient
10006001	Kit 8 floats spheres at known density 0,84 ÷ 1,59 g/cm ³ certified
10006005	Float sphere at known density 0,84xx ÷ 1,49xx g/cm ³ certified
10006007	Float sphere at known density 1,60xx ÷ 2,30xx g/cm ³ certified
10006016	Automatic Gravity system for solutions (High and Low) with all accessories
40380731	Chiller - (optional) Led Display 15L/min
78000716	Metal basket
00100115	Software density Gradient, optical microscope, storage measures