

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:

- Lexan-pvc bath capacity: 18 litres
- Two or three columns 850 mm length, 55 mm Ø, basing on model.
- touch screen display 9" for control apparatus.
- Integrated system for circulating the water flow inside the tank.
- integrated system (heating and cooling) for the autonomous management of the tank temperature (with room temperature from 15°C to 27°C) heating 10°C/h, cooling 3°C/h. Without external systems.
- possibility of connection to an auxiliary cooling system, such as chiller or open system. (For particularly hot environments or to accelerate the reaching of the set temperature)
- camera for viewing measurement points on the display.
- automatic detection of the column measurement height (±10 microns) via encoder.
- management of calibration curves with up to 24 calibration spheres each.

- possibility of video recording of the entire column for post-processing of the data.
- buttons for manual movement of the Y axis
- drain system at the bottom of the column for easy emptying.
- double LED strips for optimal lighting
- Overall dimensions : 380 x 780 x 1220 h mm
- Weight: 85 kg
- Power supply: 230 V – 50 Hz – 2 kVA monophase

Standards	
ASTM	D1505
ISO	1183-2

The 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.



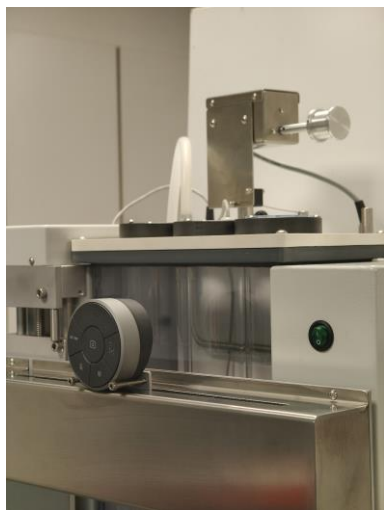
Principle :

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.



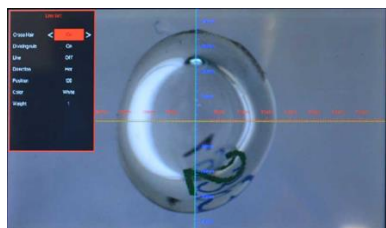
CAMERA SYSTEM

The camera to be able to read anywhere in the columns is mounted on a system of two-axis guides XY, 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. Vertical movement of the Y axis, however, is controlled by a motorized system, which adjusts the camera with centesimal precision.



The instrument is equipped with a motorized system for the recovery of floats and samples with the aid of a glass or metal basket, without altering the gradient. The system is integrated into the column group

View of the calibrated marker float



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: 570 x 400 x 1200 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 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 – Triethylphosphate

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.



Dimensions: 380 x 780 x 1220 mm h

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/cm3 certified
10006005	Float sphere at known density 0,84xx ÷ 1,49xx g/cm3 certified
10006007	Float sphere at known density 1,60xx ÷ 2,30xx g/cm3 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