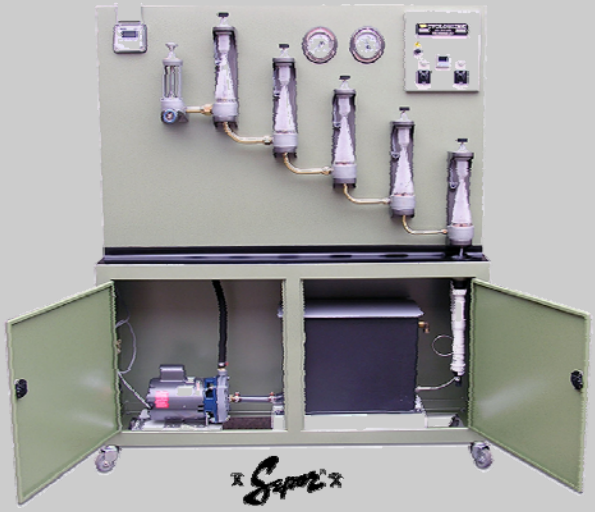
SEPOR, INC.
718 N FRIES AVE.
WILMINGTON, CA 90744
310 830 6601
EMAIL: info@sepor.com

Cyclosizer



The Cyclosizer is a laboratory precision apparatus for the rapid and accurate determination of particle size distribution within the sub-sieve range.
Particles are separated according to their Stokesian settling characteristics by a principle based on the well known hydraulic cyclone principle.
The effective separating range is 50 to 8 microns for material of a specific gravity similar to quartz (SG 2.7), but the lower limit may extend down to 4 microns for particles of high specific gravity.
For example, Galena with its SG of 7.5, may be separated down to 4-5 microns.
Samples of up to 100 grams of minus 200 mesh or minus 325 mesh material may be separated into five fractions. The time required for an effective separation can range from 10 minutes to as long as 30 minutes. Extra time is required for dewatering and drying and weighing the separate fractions.

The apparatus consists of five 3 inch diameter cyclones and ancillary equipment all mounted on a console cabinet with all necessary controls and gauges. The unit is shipped completely assembled and ready for use. It required as service items, single phase power, clean water at 9 to 14 liters per minute and a floor drainage point.

General Operating Procedure

Weigh out the sample, slurry with water and transfer to the sample container. Then fit sample container on panel, start pump and pass water through the Cyclosizer to expel air. Set water flow at 25% greater than the pre-determined separation flow rate, open port on sample container and obtain a preliminary distribution of solids to the cyclones (five minutes). Now, reduce flow rate to the pre-determined value and elutriate for 10 to 30 minutes, depending on precision required. When elutriating is complete, increase the flow rate and discharge the solids of each apex chamber in turn through the apex valve. Collect the discharged solids in separate beakers.
Finally, filter, dry and weigh each fraction and calculate solids passing No. 5 cyclone by difference.

Catalog No.	Description	Ship Weight	Ship Volume
050B-001	Cyclosizer, 220 V/1 Ph/50 or 60 Hz	890 Lbs.	75 CuFt

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The Cyclones have glass bodies with machined brass vortex and apex fittings finished in baked enamel. Interconnecting tubing in brass, cyclone support brackets finished in baked enamel. The Rotameters are Brooks Rotameter with metric scale and brass fittings. The Pump is a mechanically sealed water pump with wet end parts in brass, stainless steel shaft and single phase motor. The pump is fed from a fiberglass feed tank fitted with a ball float valve. A pressure gauge is fitted to the pump discharge line and a temperature gauge shows the temperature of water in the feed tank. The Cabinet is a sheet metal cabinet finished inside in white enamel and outside in green enamel.

Doors in the front of the cabinet allow access to the feed tank and pump. The cabinet is mounted on castors. The Electrical Controls are configured in a panel comprising a pump switch and indicating light, process timer (0-60 minutes) with alarm buzzer. The Cyclosizer is supplied to operate from a 230V/1 Ph/50 or 60 Hz AC electrical supply.

The principle of the Cyclosizer is based on a conventional hydraulic operation in which the apex discharge solids are re-pulped with water and re-passed through the same cyclone many timed at the same liquid flow rate. By this process, the slower settling rate particles are gradually eliminated through the overflow until as the number of passes approaches infinity, no more particles are removed in the overflow and all the particles which remain in the final apex discharge are found to have settling rates equal to or greater than that of a well defined "limiting size".

For homogenous particles, this "limiting size" depends on the usual cyclone variables, i.e., liquid flow rate, feed inlet diameter and vortex finder diameter. For a fixed flow rate, decrease in either or both of these diameters results in a smaller "limiting size".

In the Cyclosizer, the principle of re-passing the apex discharge is achieved by the closed apex chamber and the "upside down" mounting. Particles fed into this system respond in the usual manner with the larger moving towards the conical wall and upwards, with a portion of the water, to the apex chamber. The solids then tend to be carried back by the water flow into the conical portion of the cyclone, where they are re-centrifuged and given a further opportunity of leaving via the vortex finder. Particles less than the limiting size for each unit tend to remain with the water flow, leaving the cyclone through the vortex finder. After the preliminary distribution of particles throughout the five units, the approach to ideal separation increases with time of elutriation.

The different values for the limiting sizes for successive cyclones, which have the same total flowrate because of the series arrangement, are achieved by decreasing both inlet and vortex finder diameters. This develops a progressively greater centrifugal force for each successive stage.