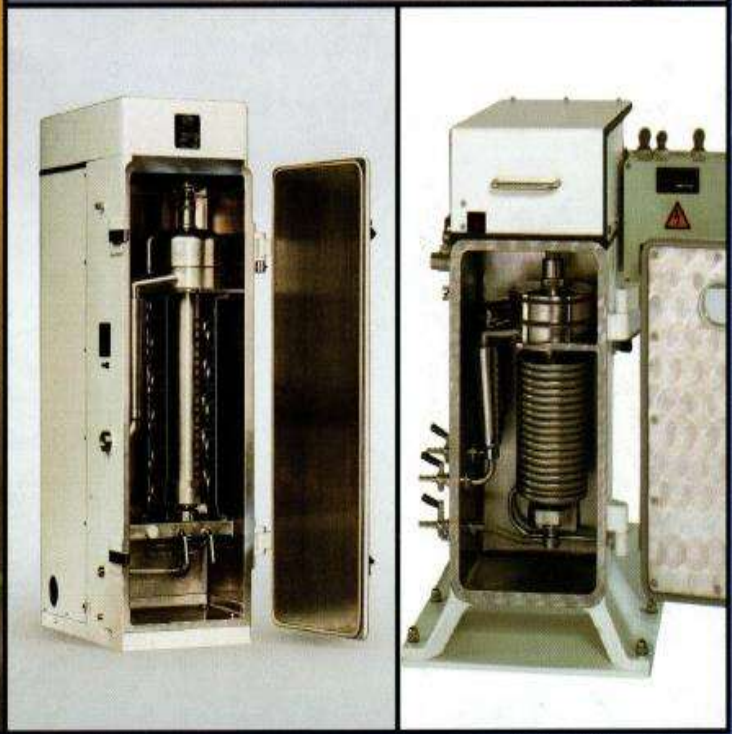


CEPA HIGH-SPEED CENTRIFUGES

For Laboratory and Industrial Processing



CEPA Centrifuges. High-Speed Separation

CEPA high-speed centrifuges are widely used in a variety of biological processes from cell harvesting and clarifying to separations of chemicals, foods, blood and pharmaceuticals. High performance is consistently achieved in continuous, semi-continuous or batch operations.

Ruggedly built in a range of sizes, CEPA centrifuges provide an efficient, cost-effective technology for research through production applications. CEPA Centrifuges efficiently separate from one to several thousand liters of biological cultures and other mixtures. For extremely high solids concentrations, drum centrifuges can be supplied for high performance separations.

How They Work

CEPA centrifuges are characterized by their ability to process many times the volume of their tubular bowl. Fluid mixtures are fed into the bottom of the rapidly rotating separating chamber. Solids are retained, while liquid components are expelled from the top of the chamber through a collection tray.

For liquid-liquid separations, two collection trays are used. The retained solids cake is dry and densely packed by the high G-forces of the CEPA centrifuge. Plastic bowl liners are available for models LE, Z41 & Z61 to facilitate cell paste removal.

The optimum size centrifuge for a given application depends on the volume and properties of the process liquid. Typical process volumes specified for each centrifuge are approximate. Contact NBS for a no-obligation consultation.

Typical Applications

- Harvesting biomass
- Clarifying process liquids
- Separating liquid products
- Fractionation of human blood
- Animal blood processing
- Bioremediation
- Processing of granular, crystalline & fibrous suspensions
- Separation of filterable & non-filterable sludges



Model LE Benchtop centrifuge for lab scale separation of process volumes from 1.5 to 15 liters. Accessories are easily added or removed without need for tools, for rapid set up and clean up.

Features & Benefits

- **Rapid separations**
- **Consistent performance**
- **Range of models** facilitate scale-up
- **Simple to set up, use and clean** for minimal down-time between separations
- **No replacement membranes**, or costly disposables
- **Small footprint** saves space
- **Enclosed models available** for ambient gas control
- **For mixtures with very high solids concentrations**, drum centrifuges can be supplied
- **Powerful 3-phase electric motors** (in models Z41 - Z101) provide rapid acceleration, and quieter operation
- **Permanently-lubricated oversized head bearings** maintain long service life



Model GLE

and Solids Removal From Process Fluids

Model LE:

This benchtop laboratory model, shown at left, features variable speed as standard and a wide choice of optional bowls for research, scale-up experiments, and small volume production. The LE is typically used with 2 to 15 liter cultures. Maximum throughput is 30 liters/hour.*

Model GLE:

This enclosed benchtop lab model processes 2 to 30 liters. Model GLE allows ambient gas control, and is pictured on page 2 with an optional cooling coil.

Model Z41:

This small, dual-purpose, floor-standing machine is employed in large or small pilot-scale applications, and is typically used with 20 to 75 liter culture volumes. Maximum throughput is 500 liters/hour.*

Maximum throughput shown was obtained with water. Throughput will decrease with thicker or more viscous cultures.

Model Z61:

This large-capacity floor model allows convenient handling of workloads. It resembles Model Z41, only larger, and provides roughly three times the solids capacity. Model Z61 is often used in multiples for large volume production operations — typically 30 to 200 liter process volumes. Maximum throughput is 1,500 liters/hour.* An enclosed model, Z61G is also available, pictured on page 4.

Model Z81:

This large and powerful production centrifuge, shown at right, is typically used with 100 to 500 liter process volumes. Maximum throughput is 2,000 liters/hour.*

Model Z101:

As powerful as the Z81, and with a 25% larger cylinder capacity, the Z101 is typically used with 150 to 600 liter process volumes. Maximum throughput is 3,000 liters/hour.* Model Z101 is shown below; enclosed Z101G is pictured on page 1, bottom row.



Model Z81, a large production centrifuge, processes volumes from 100 to 2,000 liters depending on solids content.



Model Z41

Model Z101

(Images not to scale)

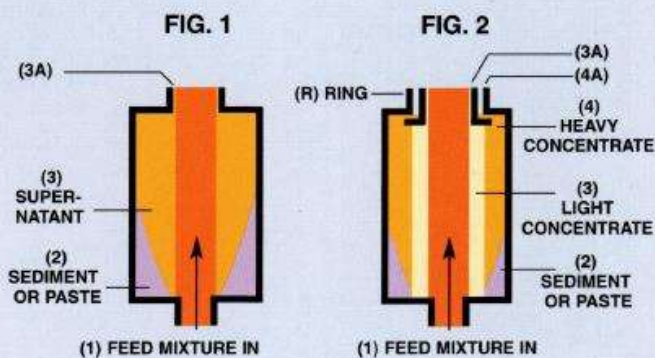


Fig. 1. Clarifying Bowl -The feed mixture enters at the bottom of the bowl (1). Biomass or other sediment collects on the walls of the bowl, forming a cake or paste (2). Clear supernatant (3) exits from the top of the bowl (3A).

Fig. 2. Separating Bowl -The feed mixture enters the bottom of the bowl (1) and sediment collects on the walls of the bowl (2). Liquids separate radially by specific gravity, and separating ring (R) directs liquids into light and heavy streams (3) and (4) which exit bowl in separate trays at (3A) and (4A).

CEPA High-Speed Centrifuges

Optional Accessories

Of the two technologies commonly used to separate fluids, centrifugation and filtration, CEPA centrifuges offer these benefits:

- **Economical to use** - no costly membranes or other disposables.
- **Faster** - in the same floor or bench space, CEPAs process many times faster than filtration systems.
- **No wasted product** - with CEPA High-Speed Centrifuges, separated solid and liquid components are readily available. Filtration systems trap and embed cell mass and other solids.
- **Consistent Performance** - no mid-run degradation as filters clog. No membrane aging or lot variations. No chemical leaching from polymeric filters.
- **Rugged** - heavy-duty construction. All stainless-steel* fluid path resists chemicals and high temperatures.

(*) Except when equipped with optional silicone rubber bottom valve.

Accessory	LE	Z41	Z61	Z81	Z101	Description
Clarifying Bowl	•	•	•	•	•	Retains solids such as biomass and discharges liquids.
Separating Bowl	•	•	•	•	•	Retains solids such as biomass and discharges liquids of different densities through bi-level upper ports.
Emulsifying Bowl	•					For emulsification of two liquids fed simultaneously into cylinder. Unique inner contour of cylinder and high speed results in an intensive and continuous emulsification.
Adjustable Separating Bowl	•					For separation of two liquids. The separation zone may be accurately controlled through the use of interchangeable separating rings of different diameters.
Closed Bowl	•					Closed cylinder meets an important need in processing extremely small quantities of materials in non-continuous operations. Contains no feed or discharge lines. Used for precise evaluation of measured charges.
Bottom Valve	•	•	•	•	•	Centrifugally-actuated silicone rubber valve prevents centrifuge contents from emptying when cylinder rotation is stopped. The valve also prevents feed input when speed is less than approximately 80% of maximum. Available for separating and clarifying bowls.

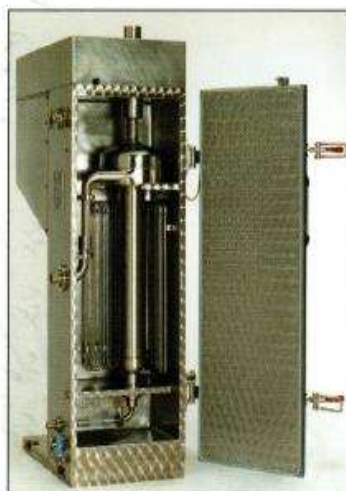
Other Options

Accessory	LE	Z41	Z61	Z81	Z101	Description
Cooling Coil	•	•	•	•	•	Fabricated of stainless steel or copper for circulation of cold water and other coolants to limit temperature rise during centrifugation.
Tachometer	Standard	•	•	•	•	Electrically-operated speed indicator.
Variable Speed	Standard	•	•	•	•	Speed adjustment is available as an optional feature for all centrifuges except the Model LE.
HEMA configuration	•	•	•	•	•	For blood fractionation and other temperature-critical applications. Features high-efficiency cooling coils and optional insulation.
Enclosed Models	•	•	•	•	•	Cast-metal chamber with optional stainless-steel-clad interior.
Explosion-Proof (DIN TZ4)	•	•	•	•	•	Various options are available for applications with volatile solvents

Specifications

Model	Bowl Speed (rpm)	G-Force	Bowl Capacity Nominal Liters	Running Load (Watts)	Dimensions, Overall		
					Width	Front-to-Back	Height
LE	15,000 to	40,000	0.25	330	16.8" (42.6 cm)	16.8" (42.6 cm)	26.9" (68.3 cm)
GLE**	40,000	40,000	0.25	330	15.7" (40 cm)	20.3" (51.5 cm)	28.5" (72.5 cm)
Z41	20,000	17,000	2.0	900	16.1" (41 cm)	28.3" (72 cm)	46.0" (117 cm)
Z41G**	20,000	17,000	2.0	900	20.8" (53 cm)	33.7" (85.5 cm)	50.0" (127 cm)
Z61	17,000	17,000	6.0	1,500	24.2" (61.5 cm)	37.0" (94 cm)	61.0" (155 cm)
Z61G**	17,000	17,000	6.0	1,500	24.4" (62 cm)	37.4" (95 cm)	68.9" (175 cm)
Z81	16,000	18,000	8.0	2,200	19.7" (50 cm)	37.4" (95 cm)	61.0" (155 cm)
Z81G**	16,000	18,000	8.0	2,200	24.4" (62 cm)	37.4" (95 cm)	68.9" (175 cm)
Z101	14,000	15,500	10.0	2,200	19.7" (50 cm)	37.4" (95 cm)	63.0" (160 cm)
Z101G**	14,000	15,500	10.0	2,200	24.4" (62 cm)	37.4" (95 cm)	68.9" (175 cm)

(**) Enclosed model.



Enclosed Model Z61G