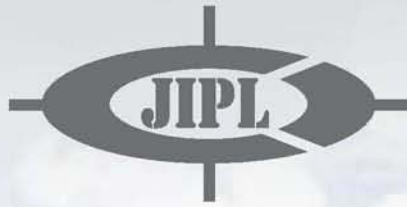




**Engineering Solutions for  
Individual Separation needs...**



**JOFLO INDUSTRIES PVT. LTD.** was founded over 42 years ago as a specialized company for manufacturing Centrifuges and is one of the leading companies in India in this field. All through this period Joflo has been focusing exclusively on design and development of centrifuges for the chemical and pharmaceutical sectors. This has made Joflo a specialist in the field, capable of manufacturing custom built and application specific equipment.

Joflo has a workforce of over 100 trained and skilled personnel in the manufacturing department and 20 personnel in other departments and sells over 200 centrifuges each year.

## Infrastructure

We have two manufacturing units in Mallapur, Hyderabad, with a total built-up area of over 25000 Sq.Ft. One of these units has a well-equipped machine shop and an assembly unit. The other unit is dedicated to fabrication. We have high capacity material handling which enables us to handle jobs weighing up to 15 tons with ease.

Our machine shop has appropriate Jigs & Fixtures which enables us to make consistent and standardized equipment.



# Product Range



**Full Body opening  
Centrifuges**



**Bottom Discharge  
Centrifuges**



**Bag Lifting  
Centrifuges**



**Horizontal  
Peeler Centrifuges**



**Top discharge  
Centrifuges**



**Trolley mounted  
Centrifuges**



**Laboratory Centrifuges**

## Performance, Safety of Operation & Reliability

We have been particularly successful with the pharmaceutical sector owing to our knowledge and understanding of GMP related issues. This expertise helps us design and regularly upgrade our products to keep up with customer requirements as well as GMP standards. Engineers who have used and operated centrifuges know that the technology involved is very demanding in terms of designing skills, precision manufacturing besides total commitment to quality.

That differentiator between the many brands in the market become obvious if one takes look at the finer details. These finer details are the ones that enhance Performance, Safety and Reliability.

### Quality :

We have dedicated personnel who handle the Quality Control function. Quality checks such as Radiography for Basket welds, DP tests for all welded parts and claddings are part of our daily quality routine. Besides, all machines are fully evaluated prior to dispatch to ensure that the machines meet the performance and specifications of the customer order.

Special emphasis is laid on machining the Bearing housing and shaft to ensure smooth and trouble free operation over several years.

We are in the process of obtaining CE Certification for our machines.

### Safety :

Safety is one of the biggest concerns today in industrial operations, specifically so in chemical industries. It requires, a special understanding of the operations of a Chemical plant to be able to design and manufacture safe and user friendly equipment. Our promoters have a sound understanding of API manufacturing activity and have firsthand experience with operational and safety issues.

Appropriate interlocks are provided in the machines (Mechanical and Electrical) to prevent hazards during operation.

## Vertical Basket Centrifuges

### Top Discharge Centrifuges

This is the simplest form of the centrifuge. In this model the solids are scooped out manually through the top. These machines are featured with minimum space requirement, simple operation and handling.

#### General Features:

- Half Lid open (Manual / Hydraulic)
- Speed control through VFD



48" Top Discharge Centrifuge

## Bag Lifting centrifuges

A Bag Lifting centrifuge is one in which the bag is fastened to a removable top ring which acts as the lip of the basket. During operation the ring is fastened to the basket by strong latches.

After centrifugation the lid of the machine is opened and the product is discharged by detaching the removable top which comes out along with the filter bag. The bag is carried to a desired location and unloaded.

### General Features:

- Full Lid open (Hydraulic / Spring operated )

### Optional Features:

- Bag Lifting device (Hydraulically operated)

## Hydraulic Lifting Device

This device dispenses with the need for an overhead hoist. The device can be made of Mild Steel clad with Stainless Steel and can be placed next to the machine inside GMP area.



## Bottom Discharge Centrifuges with Scraper (Plow)

In a Bottom Discharge Centrifuge the solid cake is unloaded from segmented openings in the base of the basket. There is a corresponding opening in the Inertia plate which enables the cake to be dropped on to a hopper which is fitted to the base of the centrifuge.

The cake is scraped from the basket by means of a knife that is positioned in such a way that when activated it plows into the cake automatically. The Operation of the knife is controlled by a hydraulic arrangement which is in turn controlled by an external electronic control system such as PLC or relays.

Usually these machines are located on an upper floor and a drier or an unloading bin is placed below the hopper to receive the cake for further processing.

It is preferable to automate these machines so that they can be run unassisted for maximum efficiency.

Bottom Discharge centrifuges are used in high throughput applications where the production output is high.



60" Bottom Discharge Centrifuge

### General Features:

- Half Lid open (Manual / Hydraulic)
- Residual cake (Heel) blow off system
- Multiport discharge (Large Central Opening)
- Tensioned rings to hold the Filter cloth.
- Scraper (Plow)

### General Features for all machine types:

- Variable frequency drive
- Tongue & Groove arrangement for lid
- 4 Point Viscous Damper Mounts
- cGMP construction

### Optional Features for all machine types:

- Zero speed interlock
- Clean in place (CIP)
- HMI
- Vibration Monitoring
- Cake Thickness sensor
- PLC controlled operation
- Full Body opening
- Hoop free Basket
- Nitrogen Blanketing
- Solid S.S. Cone

## Zero Speed Interlock

It is a safety requirement that the machine lid opens only when the basket has come to a stop.

To ensure that the machine is not opened during operation a zero speed interlock is provided which operates on receiving a signal that the basket has stopped. A solenoid valve activates a pneumatic cylinder whose plunger locks the lid of the centrifuge when the basket is in rotation.

## Vibration Monitoring

We have a variety of vibration monitoring devices the most common among them being the vibration switch which works on the Accelerometer principle.

The device trips the motor when the vibration of the centrifuge exceeds a preset limit.

Other devices which can monitor the condition of the machine are also available.

## Full Body Opening Centrifuges

A Full Body Centrifuge is one in which the entire monitor casing opens out when required. This is achieved without the cumbersome process of unfastening a number of manual bolts that are typically used to fasten the monitor casing. The Opening mechanism consists of a hydraulic arrangement which when activated pulls out the monitor casing. When the monitor casing is closed it is clamped to the lower body flange by means of quick clamps which ensure a vapour tight sealing.

These machines are commonly used where the cleaning process needs to be validated. This would also be useful in sites where there are frequent product changeovers.

The entire monitor casing can be opened by means of a hydraulic arrangement, thereby exposing the basket and the drain platform which can be thoroughly cleaned and product changeovers can be easily affected.

In this model we also can provide an additional lid on the top which can be either operated either manually or hydraulically during regular batch operations.



60" Full Body Open Centrifuge

## Nitrogen Blanketing System

Nitrogen Blanketing is done to reduce hazards while centrifuging volatile flammable solvents. The system consists of a series of valves, pressure switches and solenoid valves that work in tandem to ensure safe operations.

The centrifuges intended for inertization are in vapour tight construction and are provided with inlet and outlet ports for the purging gas. Inertization can be carried out for both Monitor Casing as well as Bearing Housing

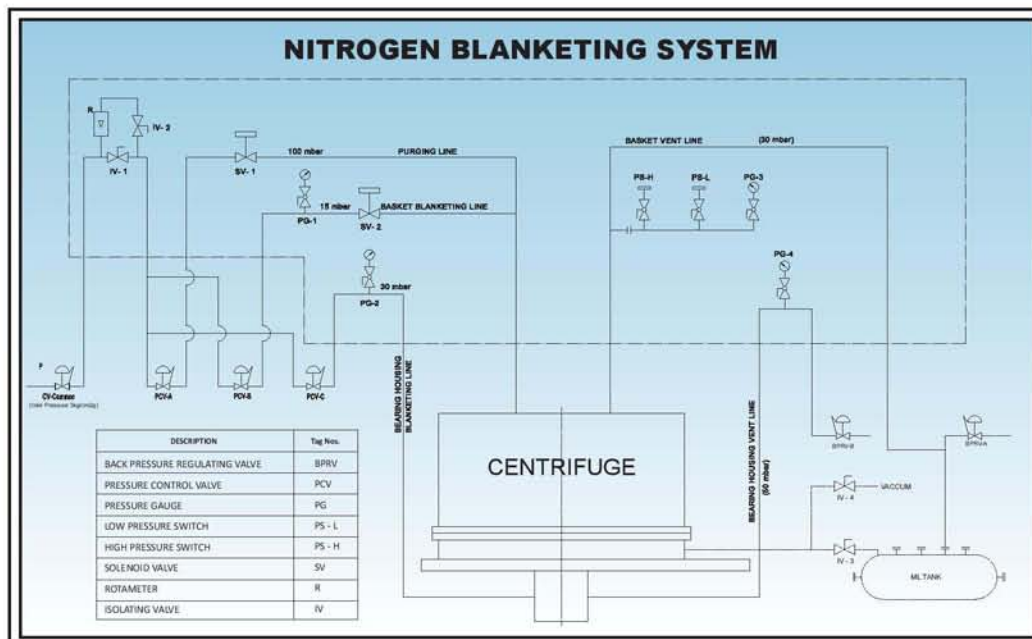
These systems can be operated in semi automatic or automatic mode. In case the Nitrogen Blanketing system is being automated a PLC (Stand alone or main Centrifuge PLC) is used to control the program.

In special cases an online oxygen analyzer is incorporated in the system to restrict oxygen levels within safe limits.

A schematic diagram is shown below for the Automated Nitrogen Blanketing system.



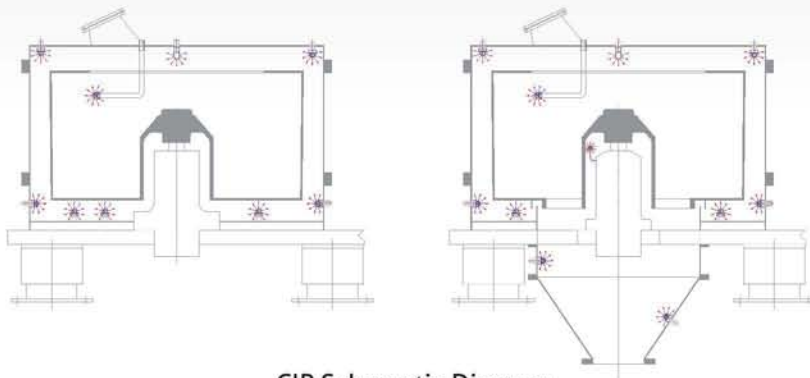
Nitrogen Blanketing Panel



## CIP (Clean-In-Place)

Clean-in-Place is preferred by Pharma Companies where frequent cleaning is required to prevent batch to batch contamination / product carry over.

We offer a CIP system that is validated. Apart from locating nozzles at strategic points which would provide a direct high pressure spray of cleaning water or solvent, care is also taken to flush grind all probable areas where product or liquid can adhere and become sources of contamination.



CIP Schematic Diagram



CIP validation by Riboflavin Test

## Cake Thickness Sensor

Cake Thickness sensors are available in two types viz. Mechanical and Ultrasonic sensors.

This feature enables the monitoring of the feeding process and assists the operator to avoid over filling or under filling the basket and ensure optimum utilization of the basket volume.

The mechanical system consists of a lever which is shaped like a Hydrofoil which skims over the cake as it builds up during feeding operation. As the cake builds up the lever rotates about a pivot. As the preset feeding volume is reached a sensor sends a signal to the control unit to trigger an alarm or to shut the feed valve automatically (In PLC controlled centrifuges).

## Hoop Free Baskets

Recent developments in Good Manufacturing Practices require that equipment have minimal crevices and locations where product can get lodged.

To minimize such build up in baskets we recommend Hoop Free baskets.

## Solid Stainless Steel Cone

We also offer Stainless Steel cones without the conventional Cast Iron or Mild Steel cores. Stainless Steel cone prolong the life of the basket in corrosive atmospheres and are ideally suited for centrifuges used in clean rooms for final pharma stages.

Halar/ PFA lining done on baskets having Stainless Steel cones have longer life than lining done on Stainless Steel clad baskets.



## HMI (Human Machine Interface)

A variety of HMI panels are available with certifications for hazardous area operations. These HMI's are available in both Key pad operation as well as Touch screen.

## PLC control

Machine operation can be automated by using PLC to precisely control machine functions. Beginning with the start up to the end of the cycle all functions can be taken care of by the PLC system.

## Material of construction

We fabricate machine parts in various materials of construction such as

- Stainless Steel (316, 304 & 904L)
- Nickel Alloys (Hastelloy/ Inconel etc)
- Duplex/ Super Duplex Steel
- Carbon Steel
- Rubber Lined
- Titanium
- **Fluoro Polymer Coatings** are available in the following options.  
Halar (ECTFE) / Tefzel (ETFE) & Teflon (PFA )

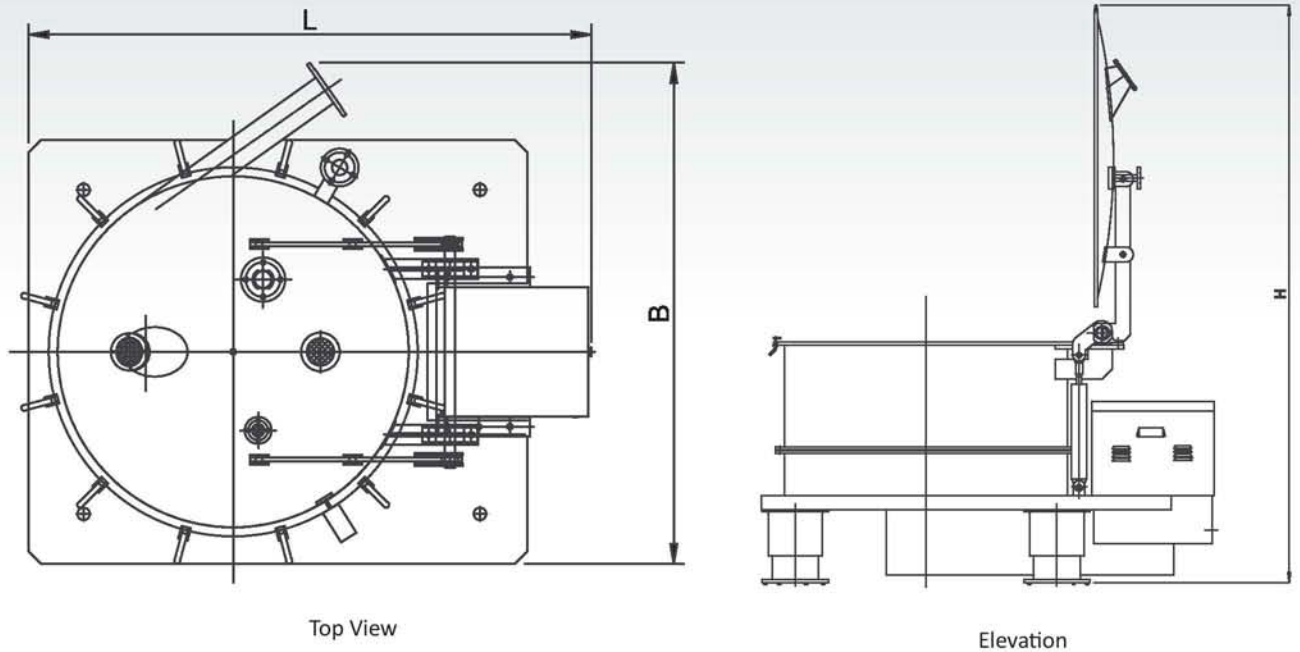


Main Control Panel



PFA Coated Basket

# Technical Specification and Space Layout



Space Layout Diagram

Technical Specification of Vertical Centrifuges							
Machine Size		12"	18"	24"	36"	48"	60"
Basket Diameter	mm	300	460	610	915	1210	1500
Basket Height	mm	205	250	300	460 / 510	510 / 610	610 / 660 / 760
Basket Solid Capacity	kg	9.5	28	45	159 / 175	300 / 350	600 / 650 / 750
Basket Lip Volume	Lts	9.5	28	45		300 / 350	601 / 650 / 750
Basket Speed	RPM	2800	2000	1200 / 1400 / 1600	1000 / 1200 / 1400	900 / 1000 / 1200	800 / 900 / 1000
Motor Capacity	HP	1.5	2	3 / 5 / 7.5	7.5 / 15 / 25	15 / 20 / 30	20 / 25 / 30
G' Force	....	1320	1025	490 / 680 / 890	510 / 740 / 1015	550 / 680 / 986	534 / 684 / 845
Filter Area	Sq.m	0.2	0.36	0.57	1.3	1.93	2.87
Space Layout in mm (L x B x H)							
Top Discharge Centrifuge				1400 x	2200 x	2250 x	2700 x
		-	-	1200 x	1600 x	2000 x	2300 x
				1550	2100	2000	2200
Bag Lifting Centrifuge				1400 x	2200 x	2250 x	2700 x
		-	-	1200 x	1600 x	2000 x	2300 x
				1700	2700	3050	3650
Bottom Discharge Centrifuge					2200 x	2251 x	2700 x
		-	-	-	1600 x	2000 x	2300 x
					2700	2200	2600
FBO Centrifuge		850 x	1250 x	1400 x	2200 x	2600 x	3000 x
		650 x	1000 x	1200 x	2000 x	2000 x	2350 x
		1350	1400	1700	2400	2800	3100

# Horizontal Peeler Centrifuges

JOFLO Horizontal Centrifuges are developed through in-house design, satisfying all GMP standards and Requirements. The machine is sturdy and extremely user friendly. The drive system is separated from the process system, thereby occupying very little space in clean rooms.

The scraper is designed such that it can handle very

hard cakes with ease. The residual heel removal system ensures that there is minimum product left over in the basket, hereby making the machine completely ready for the next operation. The monitor casing when opened fully enables easy access to all wetted parts and satisfies GMP requirements. The bearing housing is completely sealed with special sealing technology. Joflo Horizontal Pharma Centrifuges are available in various MOC's.

## Features :

- Fully Open outer casing
- Flat bottom Basket for easy cleaning
- High "G" force for faster filtration and lower LOD
- Pneumatic Residual Heel Removal System
- Mechanical or Ultra Sonic Cake thickness sensor
- Intrinsically safe Operating Station
- Machined Basket
- Nitrogen purging for Basket Chamber and Bearing Housing
- Effective CIP System
- Special sealing of Rotor Shaft from process Vapours & ML's
- Completely Automated Operation with PLC System
- Quick Clamp arrangement for Outer Casing



## Technical specification of Horizontal Peeler Centrifuge

Machine Size		24"	32"	40"	50"	60"
Basket Diameter	mm	630	800	1000	1250	1500
Basket Height	mm	320	400	500	630	800
Basket Solid Capacity	kg.	47	85	170	325	600
Basket Speed	RPM	2400	1800	1500	1200	1000
Motor Capacity	HP	15	25	40	50	100
G' Force	-	2060	1450	1250	1000	850
Filtration Area	Sq.m	0.63	1	1.6	2.36	3.77

# Laboratory Centrifuges

Over the years we have studied the procedures followed in R&D labs and have found that a convenient centrifugation method was not available. t

To fill this gap we developed a small centrifuge that is portable and easy to operate. The batch sizes range from 5 to 10 liters.

These models are ideal for Kilo Lab applications besides regular R&D Labs. They are manufactured to be deployed in GMP environments.



## Pilot Plant Centrifuges

Pilot plant operations are becoming more important as several high value products are manufactured in a small scale. These models have batch volumes ranging between 28 Liters to 45 Liters and are available in fixed and portable formats.

As these products must be produced in a similar GMP environment and should use equipment similar to those that would be used when the volume of production increases and when the production is moved into a commercial scale plant.

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