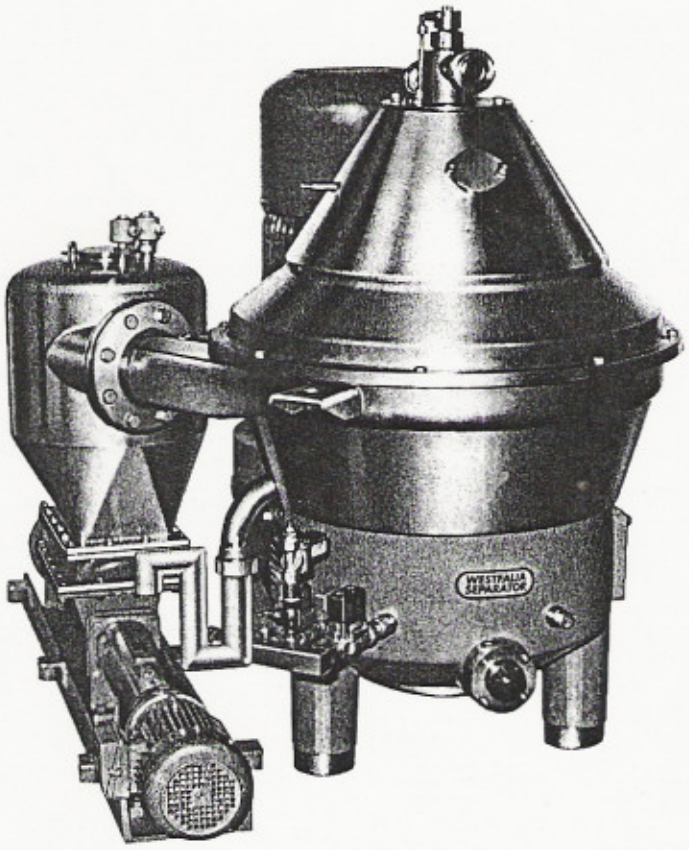
westfalia Separator

SC 35 Clarifier with Self Cleaning Bowl



SC 35-06-177
(with solids pump for enclosed solids discharge)

SC 35-06-177
Time-dependent control; photoelectric control

SC 35-36-177
Self-thinker control system sensing sediment level in bowl

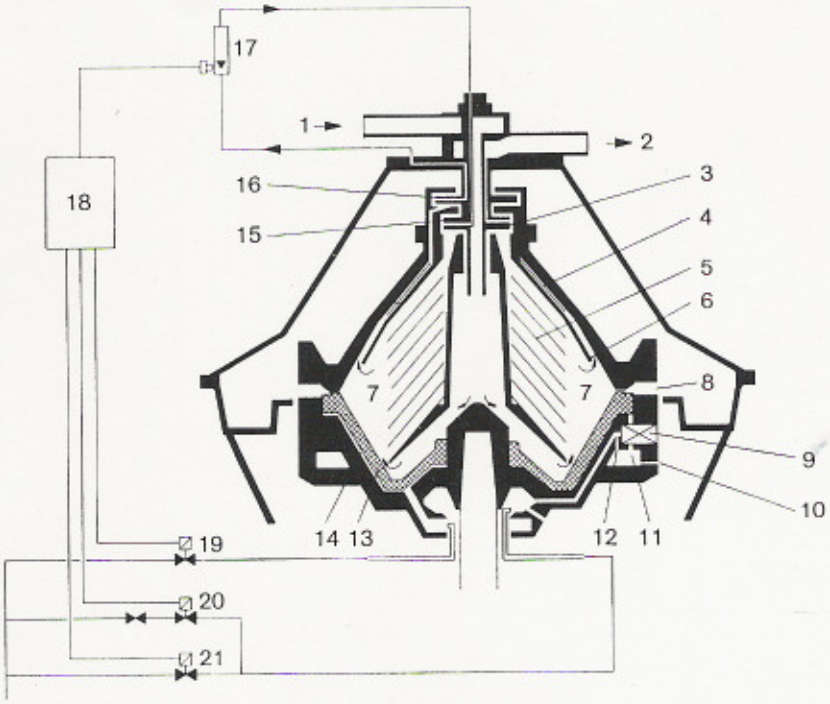
Function

Continuous clarification of suspensions; recovery of valuable solids.

Fields of application

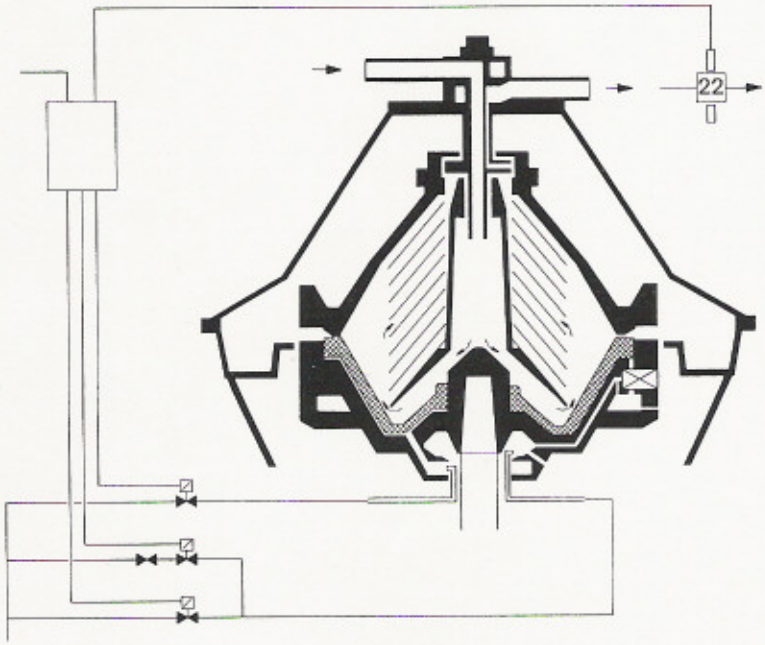
Food, beverage, chemical and pharmaceutical industries.

Operating principles and constructional features



SC 35-36-177
Bowl with self-thinker control system using sensing liquid

1 Feed
2 Discharge
3 Centripetal pump
4 Clarifying discs for sensing liquid
5 Discs
6 Separating disc for sensing liquid
7 Sediment holding space
8 Sediment ejection ports
9 Annular piston
10 Discharge nozzle
11 Storage chamber
12 Nozzle
13 Sliding piston
14 Closing chamber
15 Sensing liquid pump
16 Sensing liquid pump
17 Flow switch
18 Timing unit
19 Closing water
20 Operating water for pre-selection of amount of solids to be ejected
21 Opening water



SC 35-06-177
Bowl with photoelectric control system

22 Photoelectric cell

This clarifier incorporates the very latest developments in centrifuge construction.

The basic features of this new development are:

- New "hydrostop" system for controlled partial de-sludgings. The amount of solids to be ejected can be pre-selected when the bowl is still rotating. The product feed is not interrupted.
- Low noise pollution with enclosed solids discharge system using a solids pump.
- The self-thinker and photoelectric control systems select the ideal moment for de-sludging.
- Oxidation is prevented by means of a hermetic liquid seal.
- "Short spindle drive" for soft and vibration-free operation and low sensitivity to unbalance of bowl.
- Three-phase AC motor for slow acceleration starting.
- Belt drive; no clutch.
- Easy to service by removing the complete drive spindle and the oil pan.

Bowl

The product enters the bowl via the inlet (1) and is clarified in the disc set (5). Centripetal pump (3) then conveys the clarified liquid under pressure to outlet (2), where it is discharged without foam.
The separated solids collect in sediment holding space (7) and are ejected periodically via ports (8).
Operating water is used only during the actual process of de-sludging.

Automatic solids ejection

Bowl de-sludgings are controlled automatically by timing unit (18).

The following operations are possible:

- partial de-sludgings
- a combination of short and long partial de-sludgings

Control systems

The following systems are available for controlling the fully automatic bowl de-sludgings:

- Time-dependent control with individual programmes to suit the particular operation.
  Recommended for use with products in which the solids content remains constant.
- Photoelectric control using a photoelectric cell (22) or a turbidity meter to monitor the clarified liquid.
  If a pre-set turbidity level is exceeded, a signal is passed to the timing unit (18) which then initiates the solids ejection process. Recommended for use with translucent liquids in which the solids content is not constant or if the throughput capacity varies. This monitoring system can be installed on every standard centrifuge.
- Self-thinker control by sensing the solids level in the bowl.
  A small amount of liquid is diverted via separating disc (6). It is clarified by discs (4) and conveyed to the flow switch (17) by means of sensing liquid pump (16). It is then discharged in the main product stream via sensing liquid pump (15). If the sensing liquid inlet at the separating disc (6) becomes blocked by an accumulation of solids in the sediment holding space (7), a proximity switch installed on the flow switch (17) passes an impulse to the timing unit (18) which then initiates a de-sludging operation.

The "hydrostop" system for controlled partial de-sludgings

The bowl de-sludging is initiated by the timing unit. Product feed is not interrupted during partial de-sludgings. In the case of partial de-sludgings, the hydraulically operated sliding piston (13) must be opened within as short a time as possible so as to ensure that the ejection ports are opened wide enough to allow unimpeded solids ejection.
The sliding piston (13) is in closed position when the closing chamber (14) is full. By opening the annular piston (9), the closing water flows from the closing chamber (14) into the storage chamber (11). When the storage chamber (11) is full, the flow of liquid from the closing chamber (14) will automatically stop, although the annular piston (9) is still open ("hydrostop" system). The bowl then opens and the solids are discharged rapidly through the ejection ports (8).
The amount of solids ejected depends on the liquid level in the storage chamber (11) (controlled partial de-sludging). The amount of solids to be ejected can be pre-selected by partially filling the storage chamber (11) before the de-sludging is initiated. This is done by opening valve (20) which releases water into the storage chamber (11) through the nozzle (12).
During the de-sludging process, closing water (19) flows into the closing chamber (14) and refills it. The annular piston (9) closes after the opening water has been shut off. The storage chamber empties through discharge nozzle (10).
This new "hydrostop" system reduces the actual de-sludging time to less than 1/10 second. In the case of solids which are difficult to eject, a longer bowl de-sludging cycle is initiated after several partial de-sludgings, which has the effect of flushing out remaining solids while the product feed is still open.

Total de-sludging sequence during CIP

When product is processed, only partial de-sludgings are performed.
Total de-sludging is initiated by means of a push button on the timing unit after every CIP program step.

For total de-sludging, the closing chamber (14) is emptied via annular piston (9) and nozzle (10) by the addition of opening water (21). The sliding piston (13) remains open until the whole contents of the bowl have been ejected. Subsequently, closing water (19) is added, thus forcing the sliding piston (13) to close.

Feed and discharge

The product is fed into the centrifuge by means of a closed system of pipes. The clarified liquid is discharged foam-free and under pressure via a centripetal pump. The feed and discharge housing is equipped with sight glasses. All valves and gauges must be installed separately from the machine.

Hermetic liquid seal

In the -06-version, as used in the beverage industry, the product is sealed off from contact with the outside air at the centripetal pump by means of an additional disc immersed in liquid.
In the -36-version, the product is sealed off by means of a sensing liquid pump (16) situated above the main centripetal pump.

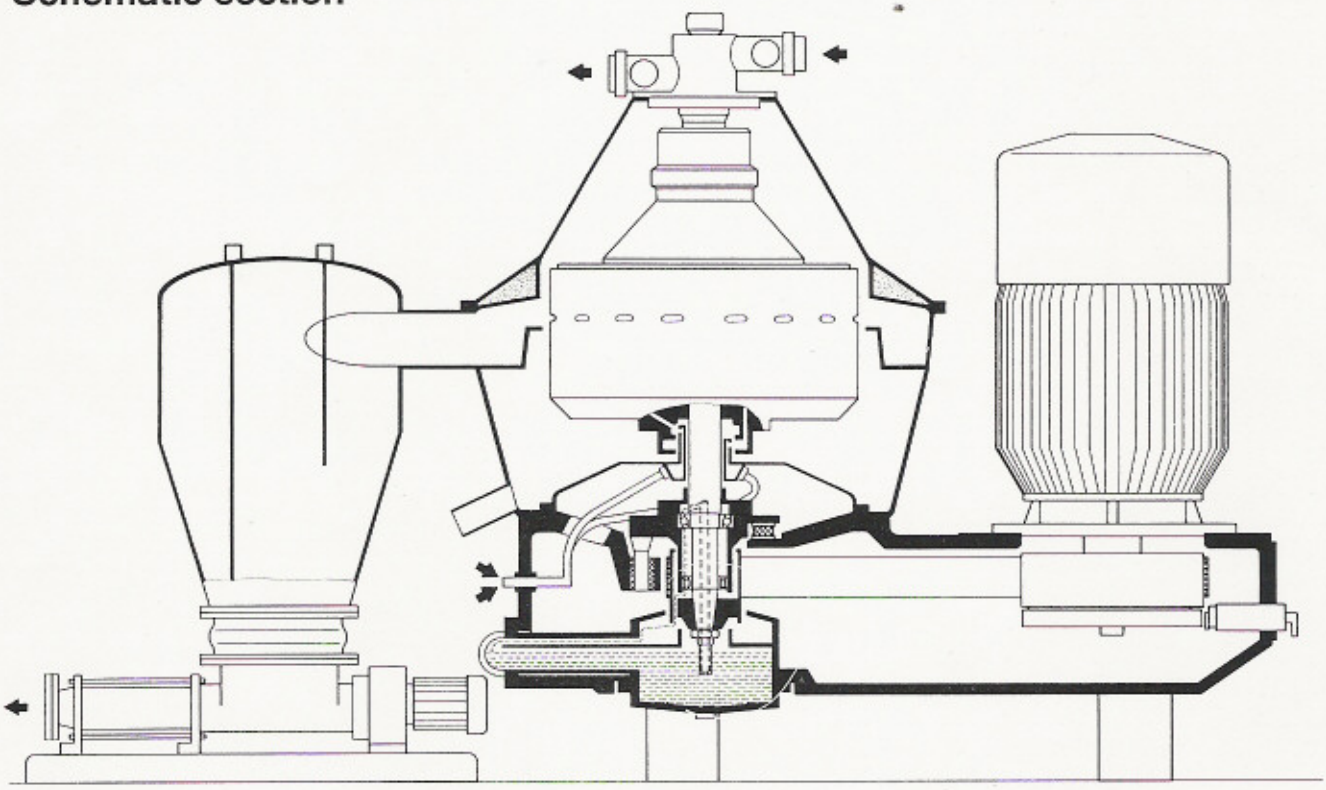
Cleaning-in-place (CIP)

Once the centrifugation process has been completed, the machine can be cleaned-in-place. The cleaning solution is circulated round the centrifuge and the connected system.

Frame and drive

The frame is made of cast iron. Vibrations are minimized by rubber cushions placed between the frame and foundation.
The machine is driven by a three-phase AC motor designed for heavy load starting using star-delta switching. Power is transferred directly to the bowl spindle by a flat belt, without the intermediary of a clutch. The drive is cushioned, thus reducing the load on bearings which might arise from unbalance of the bowl.
The oil pan is flanged beneath the spindle (see figure below).
The automatic lubrication system incorporates a suction pipe.
The short spindle drive contributes to a reduction in rotational mass, thus enabling high bowl speeds to be attained with minimum vibration.
The simple removal of the complete spindle assembly and the oil pan facilitates servicing of the drive. The solids are pumped away in an enclosed pipe system. The solids pump is controlled by level probes. The solids cyclone is equipped with a compensator (see optional features).

Schematic section



Monitoring features

- Sight glass for lubricating oil level
- Sensing liquid flow indicator for self-thinker control system (-36-version)
- Temperature feelers and automatic cut-off for motor in case of overloading
- Electronic vibration monitor with limit contacts (optional feature)

Materials

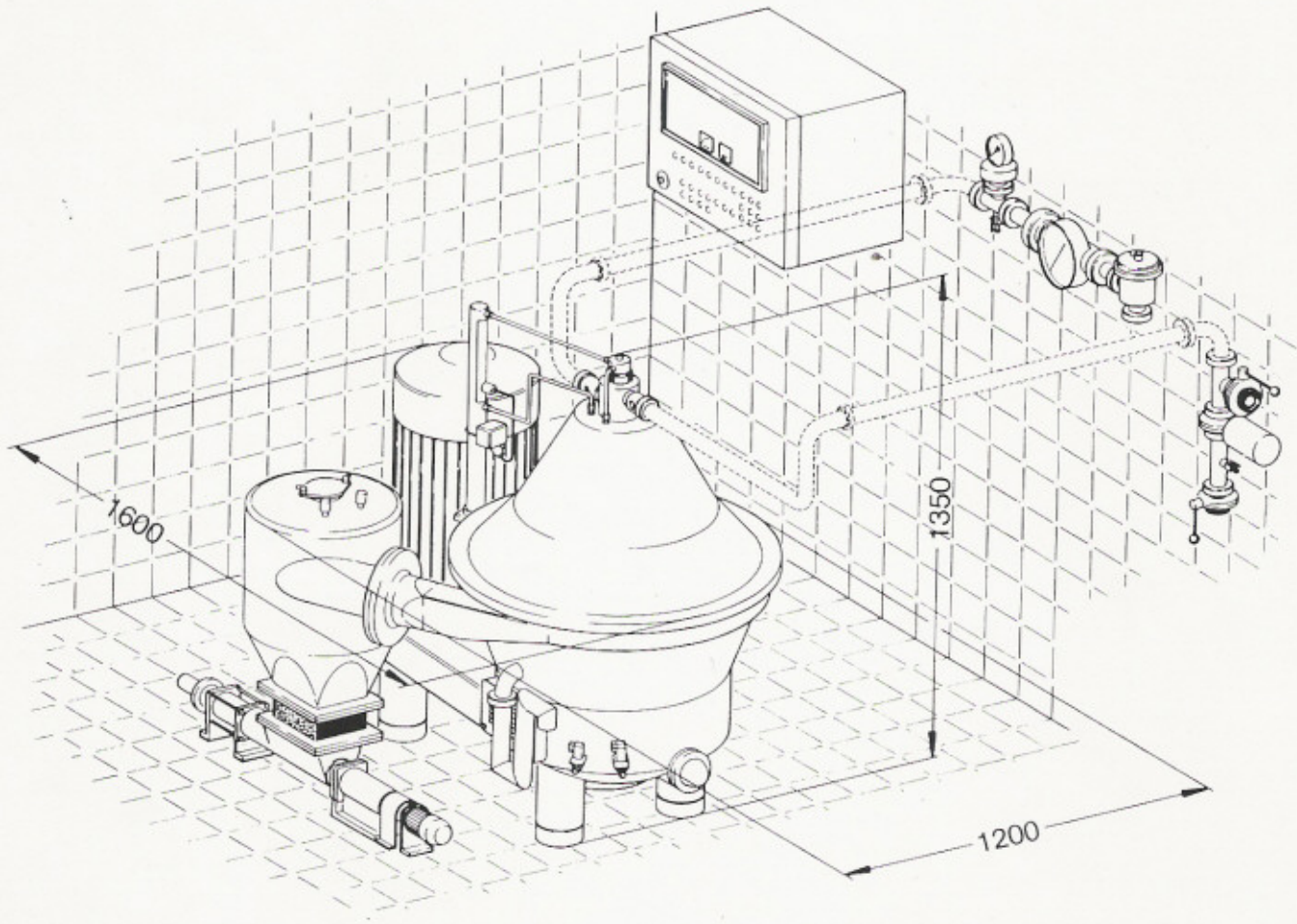
All parts coming into contact with the product, the discharged solids and the operating water are made of stainless steel.

Assembly and disassembly

The complete bowl can be detached from the spindle after removing the feed and discharge connections and the hood. Special tools are supplied with the machine. A hoist with a lifting capacity of at least 300 kg is necessary for removing the bowl.

Optional features (available at extra cost)

- Stored-program timing unit for controlling and monitoring operation
- Electronic vibration monitoring system
  This system monitors the level of vibration. If a certain pre-set level is exceeded, an alarm is sounded.
- Solids pump for enclosed solids discharge
- Illuminated sight glasses



All dimensions in mm
All figures subject to alteration

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Technical data

Technical data

Bowl		
Total bowl volume	18	l
Volume of sediment holding space (depending on disc set)	7.5–9.5	l
Max. pressure produced by centripetal pump at 25000 l/h (higher discharge pressures at lower throughput rates)	4	bar
Three-phase AC motor		
Motor power	18.5	kW
Speed at 50 Hz	3000	min^{-1}
Speed at 60 Hz	3600	min^{-1}
Type	V 1	

Weights and shipping data

Weight of centrifuge (with motor, but without bowl)	net	950	kg
	gross	1200	kg
Weight of bowl	net	290	kg
	gross	340	kg
Weight of motor	net	290	kg
Dimensions of packing cases (length, width, height)			
Frame		1800 x 1350 x 1420	mm
Bowl		550 x 550 x 600	mm
Shipping volume		3.7	m^3

Capacity

Rated capacity	25000	l/h

The rated capacity indicates the maximum throughput rate of the bowl. The actual operating capacity is usually lower. It depends on the particular product and on the required level of clarification.

Subject to modification