



GEA Centrifuges in Breweries

Continuous. Efficient. Gentle on resources.



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Centrifugal Separation Technology

Improvement of Quality and Economy

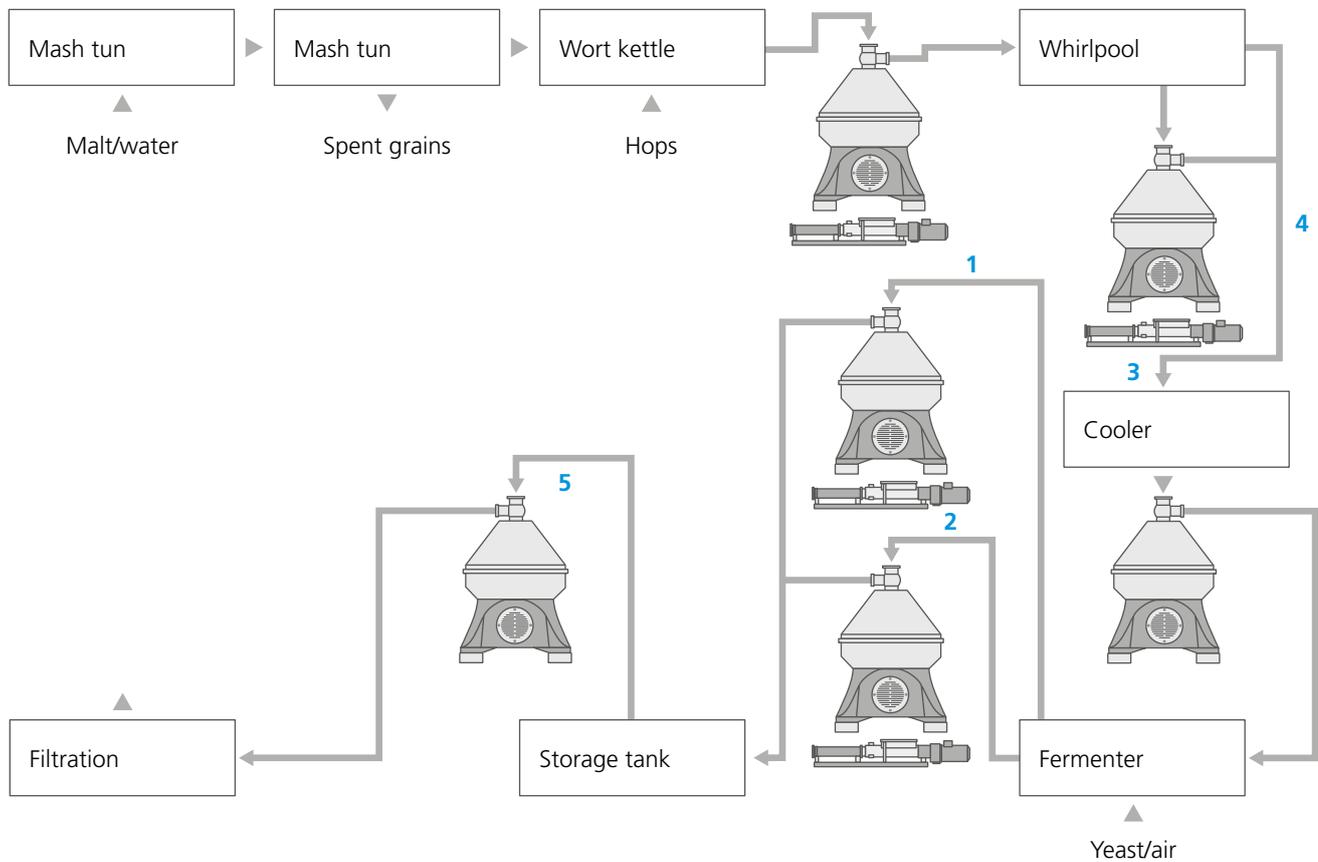
Separators and decanters play a key role in the manufacture of beer. In the decisive steps of the process, they ensure economical operation and a high quality of beer.

As a specialist in the field of centrifugal separation technology, GEA offers separators and decanters for all specific requirements. Numerous solutions for the use of separators and decanters in breweries are presented as examples on the following pages.

Features

- Maximum yield with improved product quality
- Gentle product feed for maximum clarification
- Hydrohermetic seals to prevent oxygen absorption
- Smooth, low-noise operation
- Integration in automatic processes through freely programmable controllers
- Automatic solids ejection
- High dry substance contents
- High product yield
- Optimum integration in existing CIP systems due to hygienic design
- High economy
- Rapid payback
- Reduction of waste disposal costs
- Protection of natural resources
- Reduction of storage costs
- Low-cost operation, service and maintenance





Green beer clarification

- 1 Beer recovery
- 2 Green beer clarification
- 3 Cold break
- 4 Clarified wort
- 5 Pre-clarification



Machines for Breweries

Self-cleaning separators

Self-cleaning separators can be optimally integrated in the operational processes of breweries. The solids separated in the separator bowl are ejected periodically from the bowl. Because this occurs at operating speed, a fully continuous operation is ensured.

GEA has developed its machines in close co-operation with its customers for decades. An example of this is the development of the GEA hydrostop system. With this patented design, the solids are ejected from the separator bowl in a fraction of a second. Because the solids are ejected in a very compact form by this method, short payback periods can be achieved.

Hydrohermetic seal

The development of the hydrohermetic seal was also realized in close cooperation with our customers. In this technique, the product and the atmosphere are hermetically sealed from each other. This prevents oxidation of the beer. However, this has even more advantages for our customers. In comparison with mechanical seals, the hydrohermetic seal is completely wear-free and fully CIP-compatible.

Automatic ejection control systems – optimized automation

Various control systems are available to react to differing feed concentrations and define the right time for solids ejection:

- Automatic ejection control system with turbidity measurement
- “Self-thinker” ejection control system with sensing fluid

Gentle product feed

The separators are equipped with a hydrohermetic product inlet. This new inlet system avoids shear forces on the product. The result is a more gentle treatment and an optimum clarifying effect, particularly for sensitive products. GEA has developed the so-called high-performance clarifiers especially as an upstream stage to alternative filter techniques. These machines differ from conventional separators in their increased centrifugal acceleration.

Self-cleaning separators for polishing

GEA has developed the so-called high-performance clarifiers specifically as a preliminary stage for alternative filter technologies. These machines differ from conventional separators in terms of their higher g-force.





Features

- Continuous operation
- Automatic operation
- High economy
- Versatile application
- Optimum cleaning time due to automatic ejection control systems
- Integration in CIP circulation systems
- Product isolated from the atmosphere by hydrohermetic seal
- Low space requirement
- Easy to maintain
-

Advantages

- Separation of the finest solid particles possible by the increased centrifugal acceleration
- Substantial reduction of costs for filter aid
- Reduced use of kieselguhr filtration
- Reduced use of conventional separators
- Improved taste of the beer by separation of polyphenol protein complexes
- Improved sensory stability



GEA **hyvol**[®] and **hydry**[®] Machine Generations for Any Capacity Range

GEA **hyvol**[®] and **hydry**[®] represent two new separator families. Offering optimum machine sizes, both series provide models for any capacity range needed in the beverage and food industries. The **hyvol**[®] and **hydry**[®] separators are designed for best possible customer benefit and for quick integration into individual application processes.

hyvol[®] is the name GEA gave to its separators equipped with an ejection system via piston valves. With a hydrohermetic feed system, the negative effects of shearing forces are minimized, and perfect separating efficiency can be achieved. This results in perfect separation and product quality. The hydrohermetic seal prevents the product from being contaminated by ambient air. This sealing arrangement is characterized by perfect CIP capability while being maintenance-free.

Another common feature of all the **hyvol**[®] series are the extremely quick-acting ejection valves. Product losses during separator ejections are thus reduced to a minimum.

When developing the **hyvol**[®] and **hydry**[®] series, GEA focused on highest possible DS contents of the centrifugally separated solids. GEA **hydrostop** ejection system allows dry substance values of 25–27 percent to be standard. Optimum solids concentration are reflected in very short payback times. Product losses are extremely low. All the **hyvol**[®] and **hydry**[®] separators have belt drives and are characterized by versatile functionality.

Decanters in Breweries

Decanters are solids oriented centrifuges with a solid-wall bowl. A conveyor screw (scroll) conveys the solids to the outlet ports, through which they are continuously discharged. Decanters are used mainly for clarification of liquids with a high solids content. A somewhat fluctuating solids content in the feed product has little effect on the degree of clarification or separation.

Decanters find application in breweries for

- Trub wort separation
- Beer recovery from surplus yeast
- Mash separation, especially if alternative starch sources are used

Advantages of decanters

- High yield
- Continuous operation. Processing times are practically unlimited (round-the-clock operation)
- Automatic operation and thereby savings in personnel
- Solutions of effluent problems
- Flexible with regard to feed concentration
- Versatile processing possibilities

Capacity data

The capacities indicated in this brochure for the different models are effective throughput capacities. They differ from the comparison capacity which is design dependent.

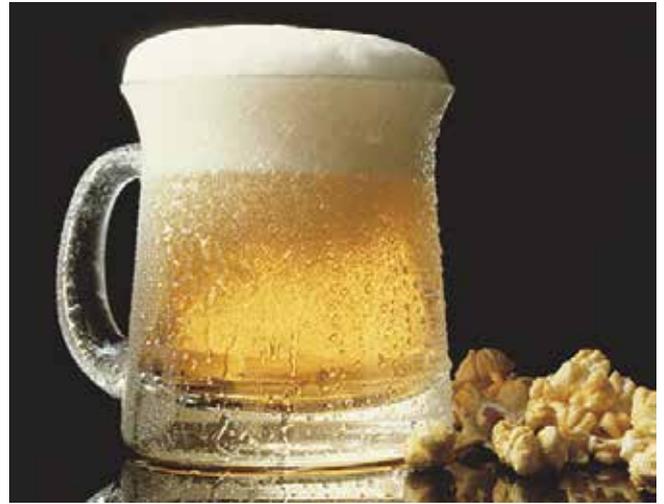


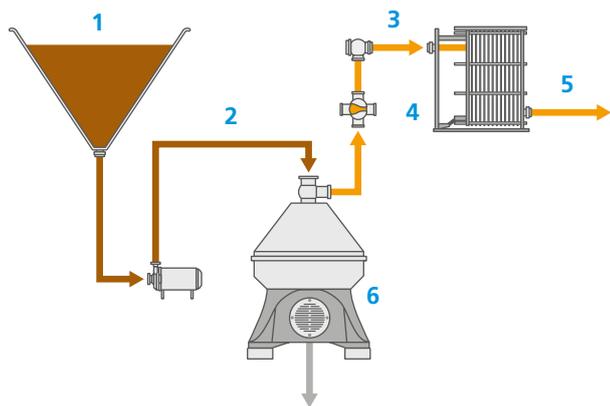
Comparison capacity

The comparison capacity refers to the different decanters produced by GEA and is lower than the max. throughput capacity.

Effective capacity

This relates to the product and process. It depends on the clarifiability of the feed mixture, on the concentration of the solids in the feed, and on the permissible residual moisture content of the discharge solids content of the clarified liquid. The decanter can be largely adapted to these conditions and requirements.





Hot wort separation

- | | | | |
|---|--------------------|---|-------------------------|
| 1 | Wort kettle | 5 | Cold wort |
| 2 | Hot wort | 6 | Self-cleaning separator |
| 3 | Clarified hot wort | | |
| 4 | Optec | | |

Hot Wort Separation

Separators are employed to separate the hot trub created during boiling. The development of this application was done to allow continuous operation and to improve the economy in comparison with conventional techniques. The separator can be integrated in the process in different variants. The clarifier can be installed either direct downstream of the copper or the intermediate turn-out vessel. Which of these is the better solution depends on several factors and should be decided on an individual basis. For example, heat retention times (isomerisation of the hops, coloration etc.) must be maintained and not exceeded.

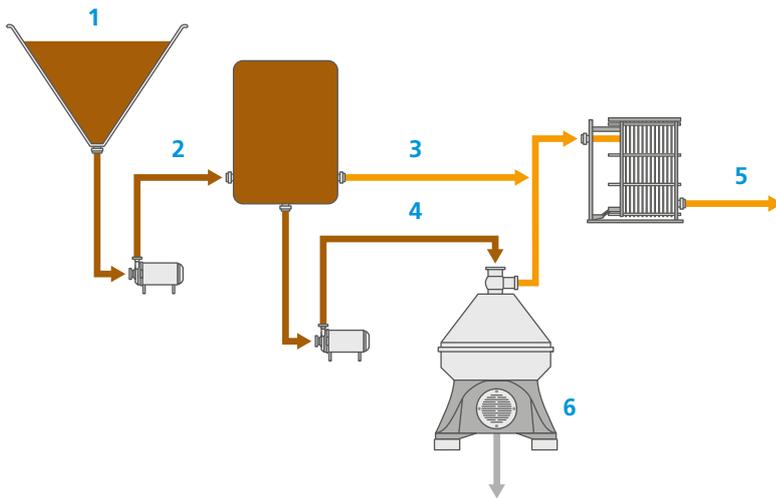
Features

- Continuous, automatic operation
- Improved product quality by defined, short contact times and defined separation rates
- High economy due to high DS content of the solids
- Lowest possible space requirement
- Optimum CIP integration due to hygienic design
- Capacity range up to 750 hl/h



GEA hydry®	Effective capacity in hl/h*	GEA hyvol®	Effective capacity in hl/h*
GSC 75i	150	GSI 75	150
GSC 95	200	GSI 125	300
GSC 200	600	GSI 200	500
		GSI 450	700

*Feed < 1.5 % v/v, discharge < 0.05 % v/v



Trub wort separation

- 1 Wort kettle
- 2 Hot wort
- 3 Clarified wort
- 4 Trub wort
- 5 Cold wort
- 6 Self-cleaning separator

Trub Wort Separation

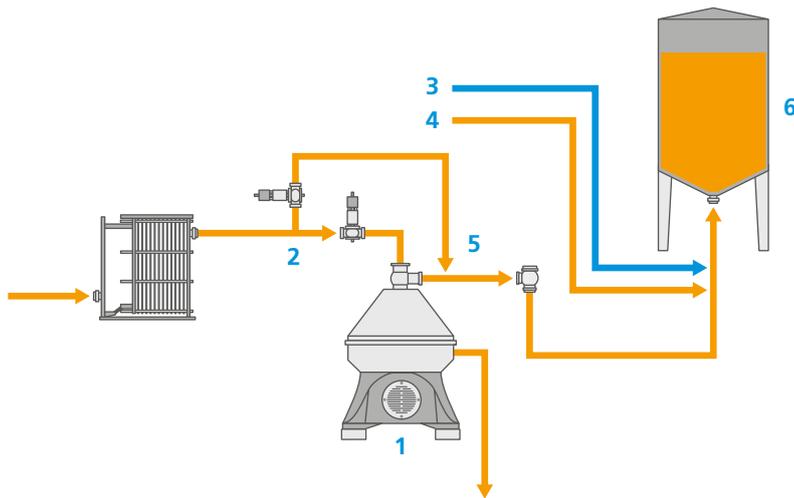
The whirlpool is employed especially to clarify the entire hot wort. Because it is not always possible to achieve a good separation of the trub due to the fluctuating quality of raw materials and different types of beer, the separator is an appropriate supplement. The trub cone produced often collapses when the wort is drained. This phenomenon causes the residual turbidity of the clarified wort to be too high and/or the losses to be very high due to the inadequate thickening of the trub. Whilst the wort is rotating in the whirlpool, the separating process can begin from the bottom. The recovered wort is then cooled. Alternatively, decanters can be used for this process.

Features

- Little loss of wort due to high solid DS
- Minimized danger of infection
- Defined, optimum clarification of the recovered wort
- Wort added to the running brew
- Low heat retention times of the trub wort
- Fully continuous, fully automatic operation
- No oxygen absorption (max. 0.05 mg/l)
- Capacity range up to 200 hl/h
- Cleaning times are shortened by continuous draining of the trub wort from the whirlpool

GEA hydry®	Effective capacity in hl/h*
GSC 75i	30
GSC 95	60
GSC 200	200

*Feed < 1.5 % v/v, discharge < 0.02 % v/v



Cold wort separation

- 1 High-performance clarifier
- 2 Cold wort
- 3 Air
- 4 Yeast
- 5 Bypass for ejections
- 6 Fermentation tank

Cold Wort Separation

In some cases, cold wort separation is also carried out in breweries. The hot trub is separated before cooling. The separator therefore separates only the remaining quantity of cold break. The cold break consists largely of small, colloidal protein particles. The viscosity of the cold wort is relatively high. Cold wort separation has differing significance in the individual breweries. A certain quantity of cold break is desired in the fermentation process, but no hot trub must be carried over under any circumstances.

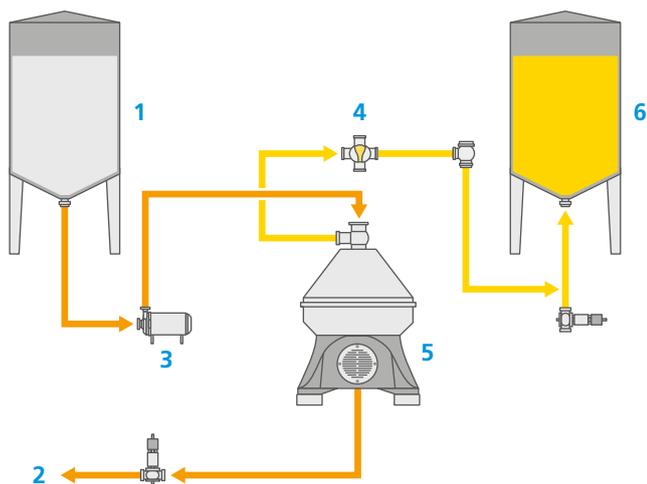
Features

- Improved taste of the beer through removal of polyphenol protein complexes
- Improved sensory stability (attached fatty acids are reduced)
- Improved heat stability (hot trub is removed if the whirlpool malfunctions)
- Optimised fermentation (fouling of the yeast is prevented)
- Filtration inhibitors are removed (lower burden of proteins on the filter)



GEA hyvol®	Effective capacity in hl/h*
GSI 50	20
GSI 65	60
GSI 160	200
GSI 230	300
GSI 400	500





Green beer separation

- 1 Fermentation tank
- 2 Saleable yeast
- 3 Feed pump
- 4 Turbidity sensor
- 5 Self-cleaning separator
- 6 Maturation tank

Green Beer Separation

The high cell count of 60 – 80 million yeast cells/ml in the main fermentation is not desired in subsequent storage. Traditionally, green beer is clarified by sedimentation of the yeast and other turbid substances. The beer is then transferred with as little yeast and sediment as possible. To obtain a controlled, rapid secondary fermentation and maturing of the beer in storage, it is appropriate to transfer with a defined number of living yeast cells. This can be achieved by using a separator. The yeast is fed into a collecting tank or the beer recovery process and the green beer is separated.

GEA hydry®	Effective capacity in hl/h*	GEA hyvol®	Effective capacity in hl/h*
GSC 75i	300	GSE 50	100
GSC 95	400	GSE 75i	300
GSC 200	700	GSI 100	300
		GSE 125	500
		GSE 180	500
		GSI 200	700
		GSE 300	850
		GSE 400	950
		GSE 450	1 200
		GSE 550	1 500

*Feed < 20 million Hz/ml;
discharge < 0.5 million yeast cells/ml

Features

- Defined secondary fermentation
- Reduction of the risk of yeast autolysis during fermentation and storage
- Harvest of the most active component of the yeast, which can be optimally employed as a starter
- Accelerated reduction of the diacetyl by dosing of Krausen
- Reduced employment of the filter
- Simple integration in existing lines
- Extended beer filter life time
- Fully automatic operation
- Due to the modern desludging mechanism, the yeast is discharged in a very compact form (24 – 26 percent DS)
- Better sale of the surplus yeast due to high DS content
- Reduction of beer losses

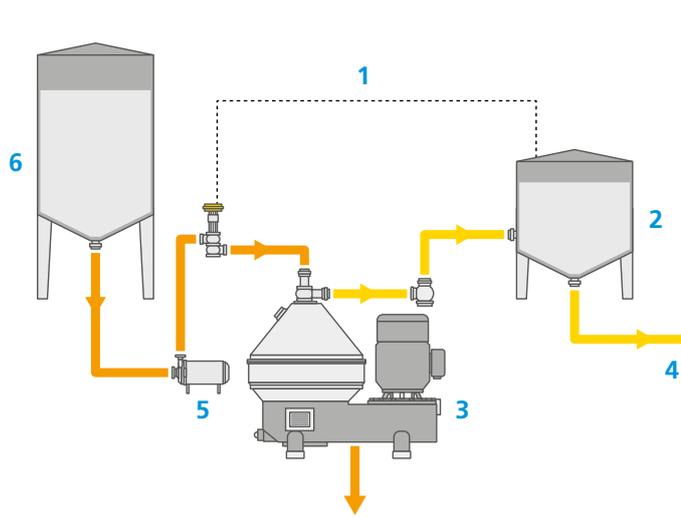
Green Beer Clarification with Addition of Yeast / Tank Bottoms

The optimum process for beer recovery is the addition of the surplus yeast and the tank bottoms in a separator during the clarification of the green beer. The advantages of the consistent product quality achieved with green beer clarification are added to the economy of simultaneous beer recovery.

Features

- Maturing and stabilisation can be carried out with a defined yeast cell count (or virtually without)
- Longer storage of the yeast before beer recovery is avoided, beer is recovered directly from the fresh yeast, yeast autolysis is prevented
- Excellent traceability of the recovered beer due to the batch to batch principle
- The separator only has to be rated for one capacity
- No further installations are necessary for beer recovery
- The recovered beer remains in the same batch
- High DS of the recovered yeast. If necessary, diluting water and not beer is disposed of with the yeast





- 1 Feed regulation depending on buffer tank level
- 2 Buffer tank
- 3 Self-cleaning separator
- 4 Filtration
- 5 Feed pump
- 6 Maturation tank

Clarification of beer before kieselguhr filtration



Clarification of Beer prior to Kieselguhr Filtration

Beers entering filtration often contain large quantities of yeast, making kieselguhr filtration difficult. Kieselguhr filtration itself is not problem-free. Means are available either to replace the kieselguhr filtration or at least to reduce the consumption of kieselguhr. By employing a separator to pre-clarify the beer, the required degree of filtering can be drastically reduced. The result is not only a reduction of filter aid, but also an increased period of operation. Of course, the centrifuges are also suitable for pre-clarifying with other filter systems.

Features

- Extension of the period of operation of the filter by up to 100 percent, therefore minimized set-up times, cleaning and waste water and labour costs
- Reduction of the total kieselguhr consumption by up to 70 percent
- Compensation of product fluctuations
- High DS of the extracted yeast and therefore reduced losses
- Income by sale of the separated yeast
- Fully automatic, continuous process
- Minimized oxygen pick-up
- Clarification of CIP media during separator CIP
- Addition of tank bottoms for beer recovery possible
- Capacity up to 1500 hl/h

GEA hydry®	Effective capacity in hl/h*
GSC 75i	300
GSC 95	400
GSC 200	700

*Feed < 10 million yeast cells/ml; discharge: 0.5 million yeast cells/ml

GEA hyvol®	Effective capacity in hl/h*
GSE 50	100
GSE 65	60
GSI 75	300
GSI 100	300
GSE 125	500
GSE 160	300
GSE 180	500
GSI 200	700
GSE 230	500
GSE 300	850
GSE 400	950
GSE 450	1200
GSE 550	1500

*Feed < 10 million yeast cells/ml; discharge: 0.5 million yeast cells/ml

Beer Filtration with PROFI

PROFI beer filtration plant from GEA combines a high performance centrifuge with a membrane filtration system, allowing perfect beer filtration without kieselguhr.

The unfiltered beer, containing fine and coarse solids, is fed into the rotating bowl and clarified in the disk stack.

The coarse solids slide into the solids space of the bowl and are ejected automatically. The clarified liquid, still containing fine solids, discharges either by gravity or under pressure by means of a centripetal pump.

The preclarified beer is sent into the retentate-free operating membrane filtration system where it passes through hollow-fibre filtration modules. Then the clarified beer is sent to the filling station. There is no installation required for retentate recycling into a tank.

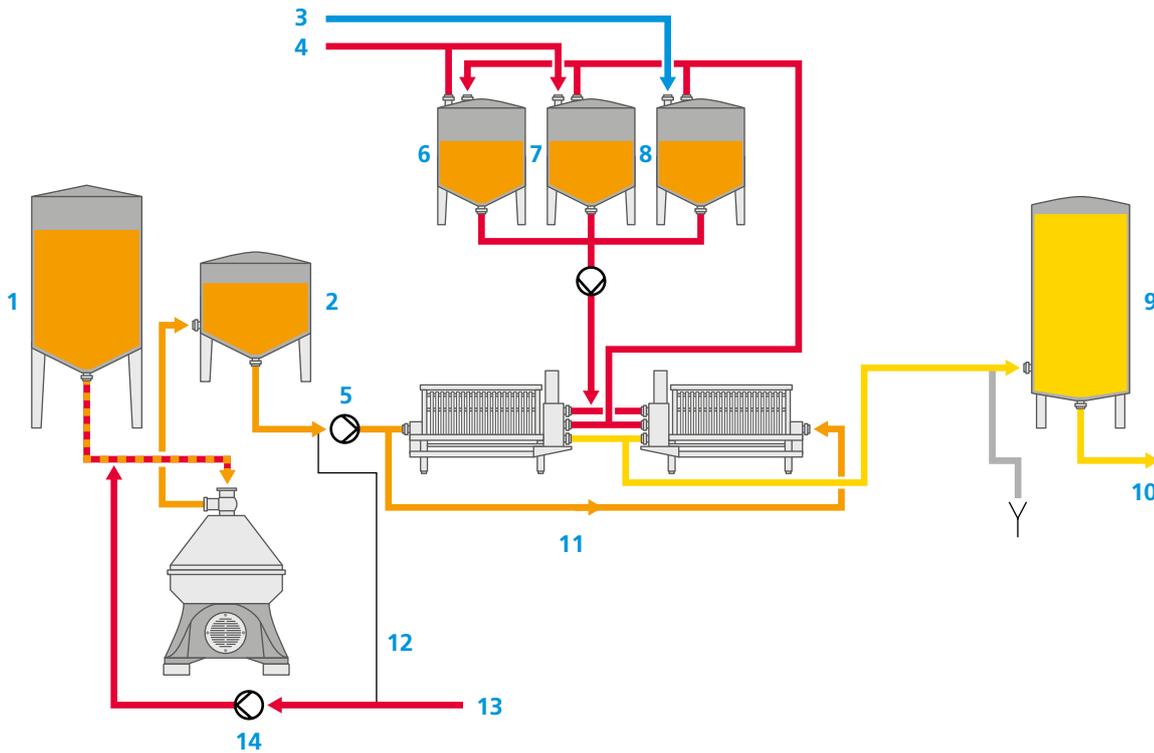
As soon as a certain transmembrane pressure is reached and the filtration efficiency decreases, the system is purged by means of CO₂. This is followed by a CIP cycle using alkaline solution and water. After “Cleaning-In-Place” the modules are disinfected at 80°C.

Features

- Very high solids concentration through a quick-acting ejection system
- Consequently, minimum product loss only
- Using high performance separators, smaller membrane systems can be chosen
- 100 percent of the yeast is separated by the high performance separator
- Part of the proteins are separated by the high performance separator
- Thus, the **PROFI** process allows retentate-free filtration

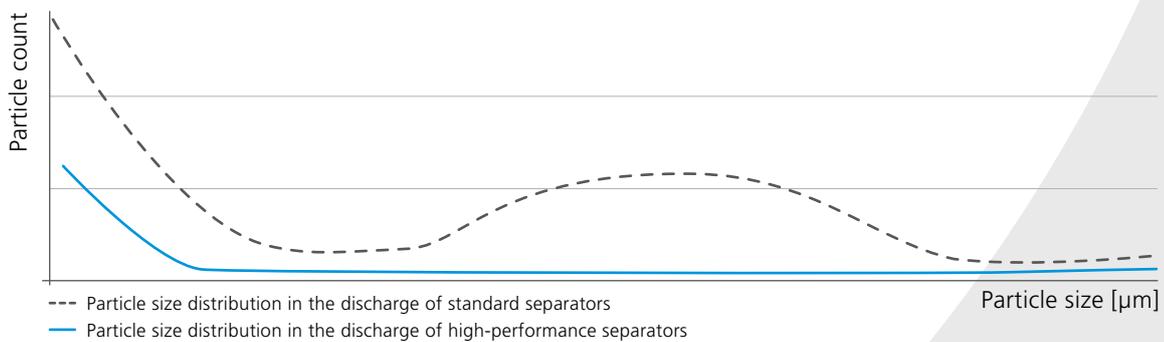
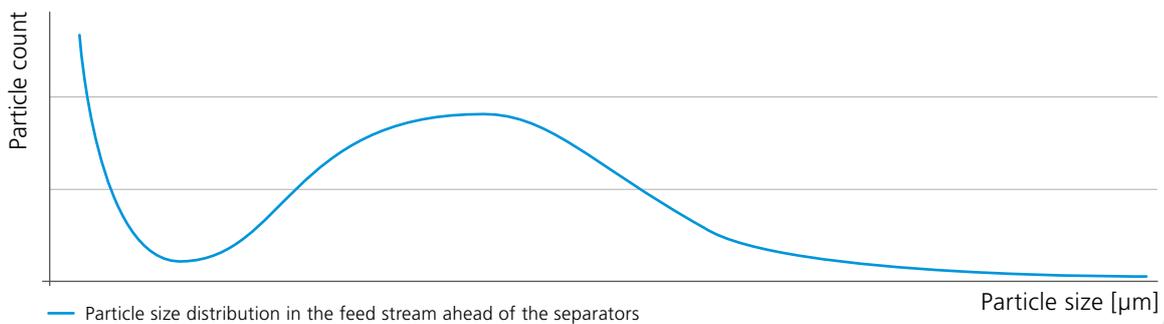


PROFI	Effective capacity in hl/h*
PROFI 200	200
PROFI 300	300
PROFI 300i	300
PROFI 400	400
PROFI 400i	450



Continuous kieselguhr-free filtration

- | | | |
|---------------|-----------------------|--------------------------------------|
| 1 MV | 6 CIP 1 | 11 PROFI filter system 50 - 400 hl/h |
| 2 Buffer | 7 CIP 2 | 12 High-performance separator |
| 3 Cold water | 8 CIP 3 | 13 CIP/water |
| 4 CIP liquids | 9 Pressure vessel | 14 CIP pump |
| 5 Feed pump | 10 To filling station | |

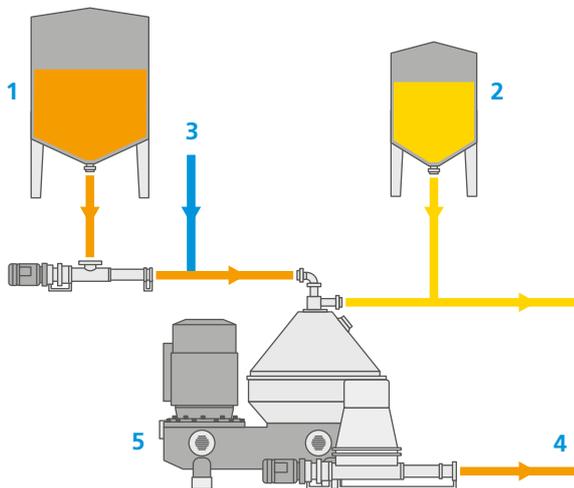




Beer Recovery

Beer Recovery from Surplus Yeast and Tank Bottoms

Depending on the process used, differing quantities of yeast and tank bottoms are obtained during the fermentation and storage of beer. In most cases, a substantial proportion of beer is still contained which must be recovered in economically managed processes. More and more breweries are investing in beer recovery – for good reasons. This improves their cost-effectiveness without changing the beer quality. Indeed, the yeast and tank bottom volume accounts for approximately four percent of total annual output, and of this figure approximately 60 percent can be recovered in the form of beer. In a brewery with an output of one million hectolitres, this corresponds to a volume of 24,000 hectolitres. Which of the three possible systems (separator, decanter and ceramic membrane filter) is used in a specific application depends on the particular circumstances of the brewery. GEA is the only provider worldwide to offer mechanical and process engineering solutions customised to every situation.



Processing with separator

- 1 Yeast tank
- 2 Beer storage tank
- 3 Water
- 4 To yeast processing
- 5 Self-cleaning clarifier

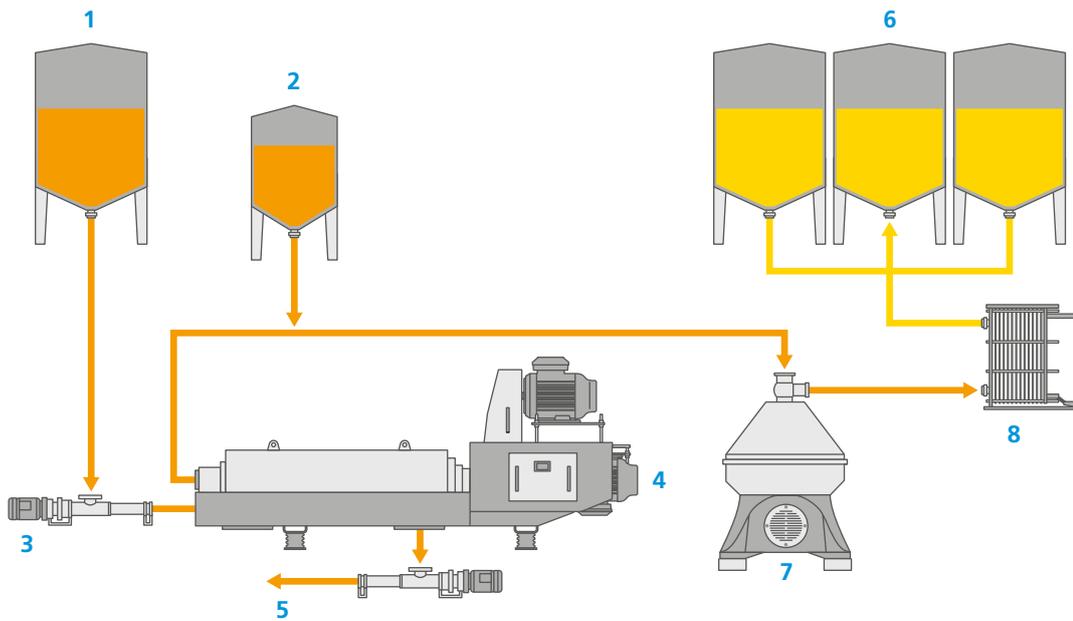
Extremely simple process management with separators

The separator represents the most simple process solution with minimum investment costs. Separators of the GEA **hydry**[®] series are used exclusively for the recovery of beer. The short processing time of just 120 seconds ensures gentle treatment of the yeast. On the other hand, production times are long: the separator is subject to standard CIP only every 72 hours. The GSC 200 separator, which is specifically suited to this task, ensures that the yeast is treated to a dry substance content of around 25 percent thanks to the GEA **hydrostop** discharge system. The hydrohermetic inlet ensures gentle treatment of the product. Depending on throughput, the recovered beer still contains around 0.1 to 2 million cells per millilitre. The hydrohermetic seal also prevents the product from coming into contact with external air, and guarantees absolutely wear-free operation.

With the GSC 200 separator, it is possible for beer to be recovered from yeast and also for the green beer from the fermentation tank to be clarified following the addition of yeast upstream of the separator (see page 17). Due to an intelligent set-up, the multi-purpose separator may be used in other processes, as described in this brochure.

In the feed, the yeast concentration may be max. 40 percent (by volume). However, using a fully automatic facility for adding water in the feed of the separator, the concentration can be reduced to the permissible level at any time.

Depending on the specific conditions, GEA also offers nozzle separators as an alternative.



Processing with decanter and separator

- | | | |
|---------------|-----------------------|---------------------|
| 1 Yeast tank | 4 Decanter | 7 Separator |
| 2 Buffer tank | 5 To yeast processing | 8 Flash pasteurizer |
| 3 Feed pump | 6 Green beer | |

Decanter plus polisher

It is possible to further improve beer recovery by means of a decanter by combining a decanter and separator or connecting a decanter and separator in series. The yeast is initially concentrated by the decanter to a maximum dry matter of 25 to 28 percent, thus achieving an optimum yield. The beer which is recovered from the decanter is then processed further in a small polisher from around 1 million cells per millilitre to fewer than 1000 cells per millilitre. The beer which is treated in this way is solids-free.



So much beer is still in the yeast

Beer recovery with nozzle separators produces clear beer

The design of these separators makes them so powerful that they can process the relevant yeast and tank bottom volumes with relatively low machine costs. This results in amortisation periods which were previously unthought-of with new machines in this special application area.

The nozzle separator processes the yeast which is additionally internally diluted with water. This makes it suitable also for small or medium-sized breweries depending on the yeast economy. In addition to the nozzle separator, a yeast collecting tank is required where the yeast or tank bottoms are stored homogeneously. In the tank, the yeast, possibly with already degassed water, is set to the original wort value or mixed "inline" on the way to the separator. The separator then continuously separates this supply into a flow with yeast of around 80 percent by volume. Using this technological trick of "washing out yeast", a nozzle separator can achieve extract yields of 90 percent. The recovered extract is likewise diluted in this case. This makes the nozzle separator process particularly suitable for "high gravity" brewing since the recovered extract is ideal for cutting the original beer to the desired strength for sale.

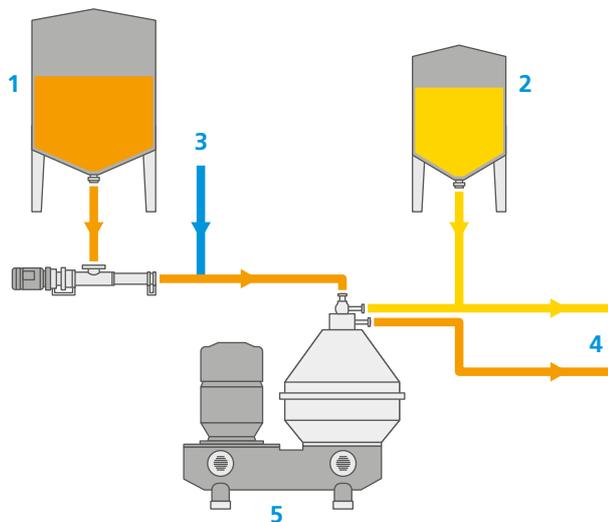
If the market demands a system which pays off in no time, GEA offers tailor-made solutions to meet these requirements.

Separator type	Effective capacity in hl/h*
GSC 95	16
GSC 200	40
CF 5000	20 – 40
HFC 15	10
HFC 45	30

*Feed < 30 %, discharge < 1 % (by vol.)

Customized solution instead of a patent recipe

In order to decide which of these beer recovery systems should ideally be used, the technology experts of GEA analyse in advance the precise individual requirements of the particular brewery. In general however: centrifugal technology used for beer recovery offers the best returns compared with all other systems. The extremely short process times provided with this technology also produce a beer of excellent quality. In order to be on the safe side, however, the beer should always pass through a flash pasteurizer facility in order to deactivate any separated proteases which would otherwise have a negative impact on the head of the beer. GEA can also offer the corresponding solutions from a single source in this respect.



Processing with nozzle separators

- 1 Yeast tank
- 2 Buffer tank
- 3 Water
- 4 To yeast processing
- 5 Self-cleaning clarifier

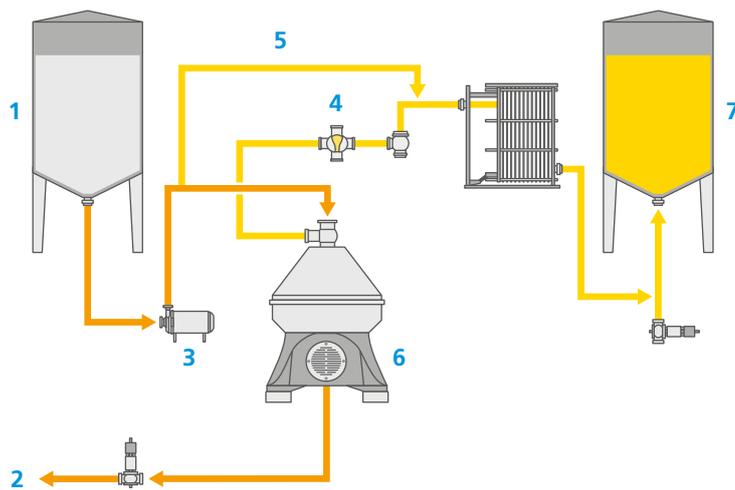
Production of Non-Alcoholic Beer

Interrupted fermentation to manufacture non-alcoholic beer

The manufacture of low-alcohol or non-alcoholic beer can be realised with separators by interrupting the fermentation process.

Features

- Short production times because the beer must not be de-alcoholised in the entire batch
- Highest product quality
- Rapid payback
- Excellent price/performance ratio
- Good microbiological control of the process
- Low costs for operation by not using filtering media
- Separator can be used in other processes too



Manufacture of non-alcoholic beer

- 1 Fermentation tank
- 2 Yeast
- 3 Feed pump
- 4 Optec
- 5 Recirculation
- 6 Self-cleaning separator
- 7 Maturation tank

Kvass Clarification

Effective clarification without filter aid

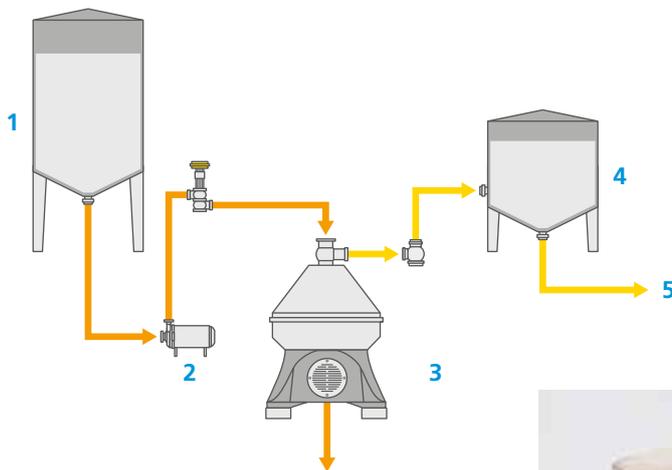
Kvass is a slightly sour, carbonated soft drink obtained by fermenting the basic ingredients water, rye and malt. It is a prized drink in many Eastern European countries, especially at warmer times of year, traditionally most common in Russia. It is also from this country that we derive the name kvass, which means something like “sour drink”. With separators from GEA, a continuous production line can be supplied which combines the simplest imaginable process management with optimum product quality.

Water, malt, rye flour and kvass yeast are required to produce kvass. Depending on the type, flavourings like mint can also be added. The process differs from the production of beer in that no hops are added and alcoholic fermentation is suppressed. As a result, kvass is usually only slightly alcoholic. Self-cleaning clarifiers from GEA are installed between the storage tank and the buffer tank and clarify the kvass from unwanted solid partic-

les such as residual yeast. The effective centrifuges work continuously, without pre- or post-run, and require no filter aids. The maximum dry substance reduces product losses to a minimum. At the same time, the product quality also says much about the clarifiers, as flavour is not impaired by absorption in any way.

Features

- Simplest process management
- Effective clarification without consumables (filter aid)
- Optimum product quality, no impairment of taste by absorption
- Low losses due to maximum dry substance
- Continuous operating mode
- No pre- or post-run
- Easy installation and integration
- Level of automation customizable to individual customer requirements



Clarifying kvass

- 1 Storage tank
- 2 Feed pump
- 3 Self-cleaning clarifier
- 4 Buffer tank
- 5 Short time heating/bottling



*Kvass – Russian national beverage
Turbid – before separation*



*Kvass – Russian national beverage
Clear – after separation*

GEA "plug & brew" Skids – Make more beer from each brew

Benefit from numerous applications in just one installation

A large volume of perfectly brewed beer is lost in the process when cellaring off. Fermentation tank bottoms contain up to 80 percent perfectly brewed beer, the unclarified hot trub even more. Get a simple-to-install GEA "plug & brew" centrifuge skid and you can keep all that beer in the brewing process.

Greater yield from the same resources

- 5 to 10 percent more beer from the same amount of raw ingredients (depending on beer recipe and brewing process)
- Same amounts of beer brewed with decisively reduced effort (less energy and hours of work)
- Multi-purpose applications in the brewing process to take your business to the next level



Make More Beer in Less Time

Be faster on the market

GEA centrifuge skids for craft brewers optimize the brewing process time by about one third without any loss of quality. Using the skid in all clarification steps, each batch goes faster with a better utilization of equipment. You are always ready to roll out a new, attractive beer without having to wait. Fast delivery always included!



GEA "plug & brew" 20

Ideal for small breweries with great visions and for test applications.

Beer clarification	up to 20 hl/h
Tank bottoms recovery	1 hl/h
Wort clarification	10 hl/h
Dimensions (H / W / D)	1500 x 1150 x 1650 mm
Motor	5.5 kW

**GEA "plug & brew" 50**

Perfect for medium-size creative breweries beginning to expand their market share.

Beer clarification	up to 50 hl/h
Tank bottoms recovery	2 hl/h
Wort clarification	20 hl/h
Dimensions (H / W / D)	1500 x 1150 x 1650 mm
Motor	7.5 kW

**GEA "plug & brew" 100**

The right choice for growing medium-to-large-size creative breweries and established regional breweries.

Beer clarification	up to 100 hl/h
Tank bottoms recovery	3 hl/h
Wort clarification	50 hl/h
Dimensions (H / W / D)	1950 x 1400 x 2050 mm
Motor	15 kW

**GEA "plug & brew" 180**

Conceived for larger creative breweries and high-potential side operations of established beer producers.

Beer clarification	up to 180 hl/h
Tank bottoms recovery	6 hl/h
Wort clarification	100 hl/h
Dimensions (H / W / D)	1950 x 1400 x 2450 mm
Motor	30 kW

**Utilities**

- Pressurized air 6 bar | CO₂ > 1 bar | water > 1 bar
- Capacities subject to solids load in the feed to the centrifuge.

Turbidity Adjustment with Separators

Continuous operation, consistent quality

Particularly in the manufacture of German “Hefeweizenbier“ (beer brewed from wheat), it is important to present the customer a product with a consistent degree of turbidity. Problems occur particularly in high storage tanks because the yeast concentration varies due to sedimentation. The use of separators is suitable in this case to compensate the concentration. The stored beer is separated. Simultaneously, unseparated beer is added through a bypass to ensure constant turbidity values throughout the entire production cycle. For this purpose, the turbidity is measured at the outlet of the separator and after mixing. The control valve in the bypass pipe is then controlled by these two values and the nominal value.

Features

- Consistent beer quality
- Continuous operation
- Simple process control

	Feed	Discharge
Hot wort	< 1.5 % v/v	< 0.05 % v/v
Trub wort	< 15 % v/v	< 0.5 % v/v
Cold wort	clarifying efficiency approx. 50 % measured in “Imhoff Funnel”	
Green beer	< 20 million	< 1 million
Pre-clarification Before filtration	yeast cells/ml < 10 million	yeast cells/ml < 0.5 million
Beer recovery	yeast cells/ml < 30 % v/v	yeast cells/ml < 1 % v/v



Capacities at a Glance

Effective capacities of the separators, in hl/h

	Type	Hot wort	Trub wort	Cold wort	Green beer	Pre-clarification before filtration	Beer recovery	Beer filtration /PROFI
GEA hyvol®	GSE 50**	–	–	20	–	60	–	–
	GSE 65**	–	–	60	–	60	–	–
	GSE 75	150	–	–	300	300	–	–
	GSE 100**	–	–	–	300	300	–	–
	GSE 125	300	–	–	500	500	–	–
	GSE 160	–	–	200	–	300	–	–
	GSE 180	–	–	–	500	500	–	–
	GSE 200	500	–	–	700	700	–	–
	GSE 230**	–	–	300	–	500	–	–
	GSE 300	–	–	–	850	850	–	–
	GSE 400	–	–	500	950	950	–	–
	GSE 450**	700	–	–	1200	1200	–	–
	GSE 550	–	–	–	1500	1500	–	–
	GEA hydry®	GSC 4/6	10	3	–	20	20	1
GSC 75		150	30	–	300	300	9	–
GSC 95		200	60	–	400	400	16	–
GSC 200**		600	200	–	700	700	40	–
HFC 15		–	–	–	–	–	10	–
HFE 45		–	–	–	–	–	30	–
PROFI	PROFI 200	–	–	–	–	–	–	200
	PROFI 300	–	–	–	–	–	–	300
	PROFI 300i	–	–	–	–	–	–	300
	PROFI 400	–	–	–	–	–	–	400
	PROFI 400i	–	–	–	–	–	–	450

* In special design

** Yeast concentration in feed: max. 5 million yeast cells/ml

Depending on extract characteristics and solids concentration in feed and discharge, the values may vary.



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GEA Group is a global engineering company with multi-billion euro sales and operations in more than 50 countries. Founded in 1881, the company is one of the largest providers of innovative equipment and process technology. GEA Group is listed in the STOXX® Europe 600 Index.

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