

Pictures and technical features are not binding. The company reserves the right to modify the features of its products without notice. Registered trademarks. Advertising material © copyright. All rights reserved.



Via Don Battistoni, 1 - 60035 Jesi (AN) Italy
Phone +39 0731.2311- Fax +39 0731.231239
www.pieralisi.com - info@pieralisi.com

Cod. 318312083 - 05/21



Plant milks

The consumption of plant milks is constantly and significantly growing all over the world.

The plant milk products are gradually changing the eating habits of many people both for their nutritional values and for their greater environmental and energy sustainability.

During the growing and processing phases, the plant products, compared to the animal milk and dairy ones, demand less natural resources by generating at the time less CO₂ emissions.

Pieralisi, always sensitive to the environmental issues and to the sustainability of the planet, has applied its technology to the production processes of different kinds of plant milks, contributing to their constant qualitative and nutritional development.

Pieralisi centrifugal decanters and separators, developed on the basis of the experience gained in the food industry, are today widely used in the various phases of separation requested during the production of plant milks, in particular:

1. **Soy milk**
2. **Almond milk**
3. **Rice milk**
4. **Oat milk**



1
Soy
Milk



2
Almond
Milk

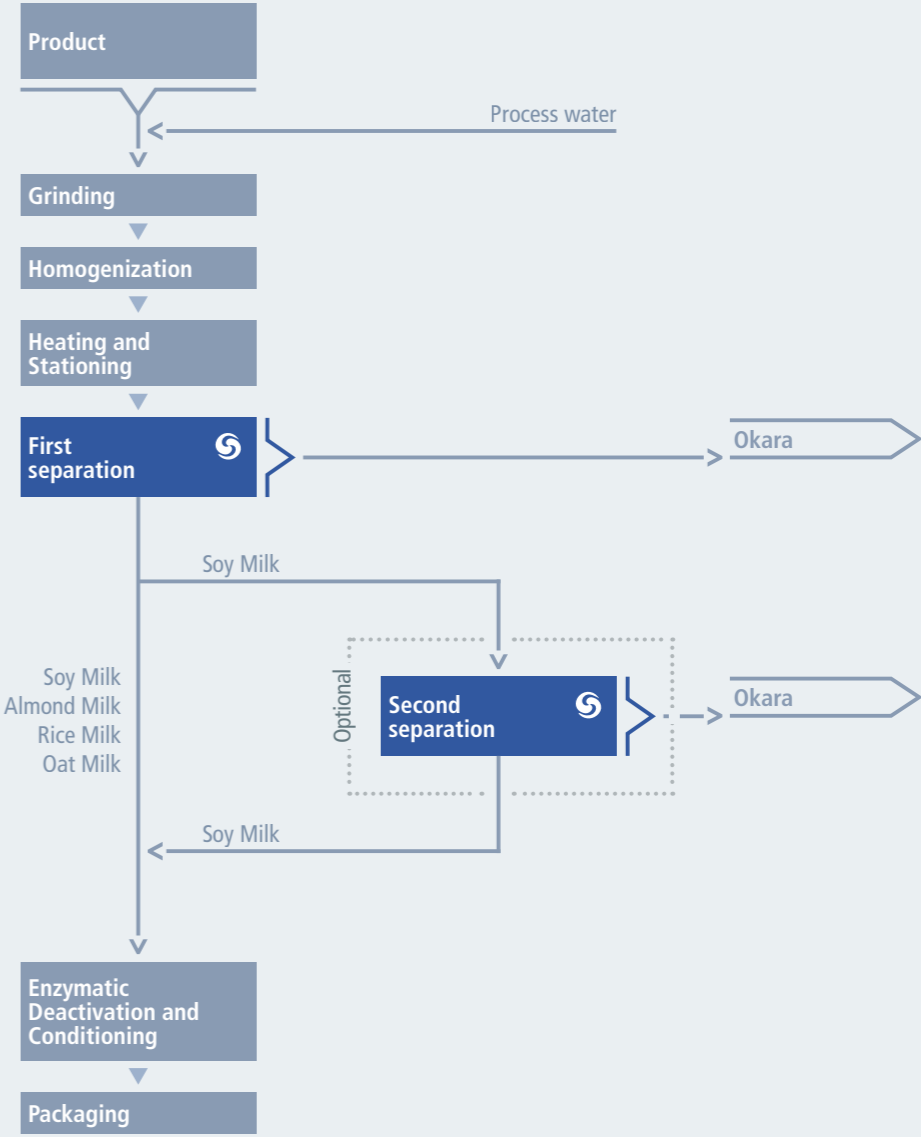


3
Rice
Milk

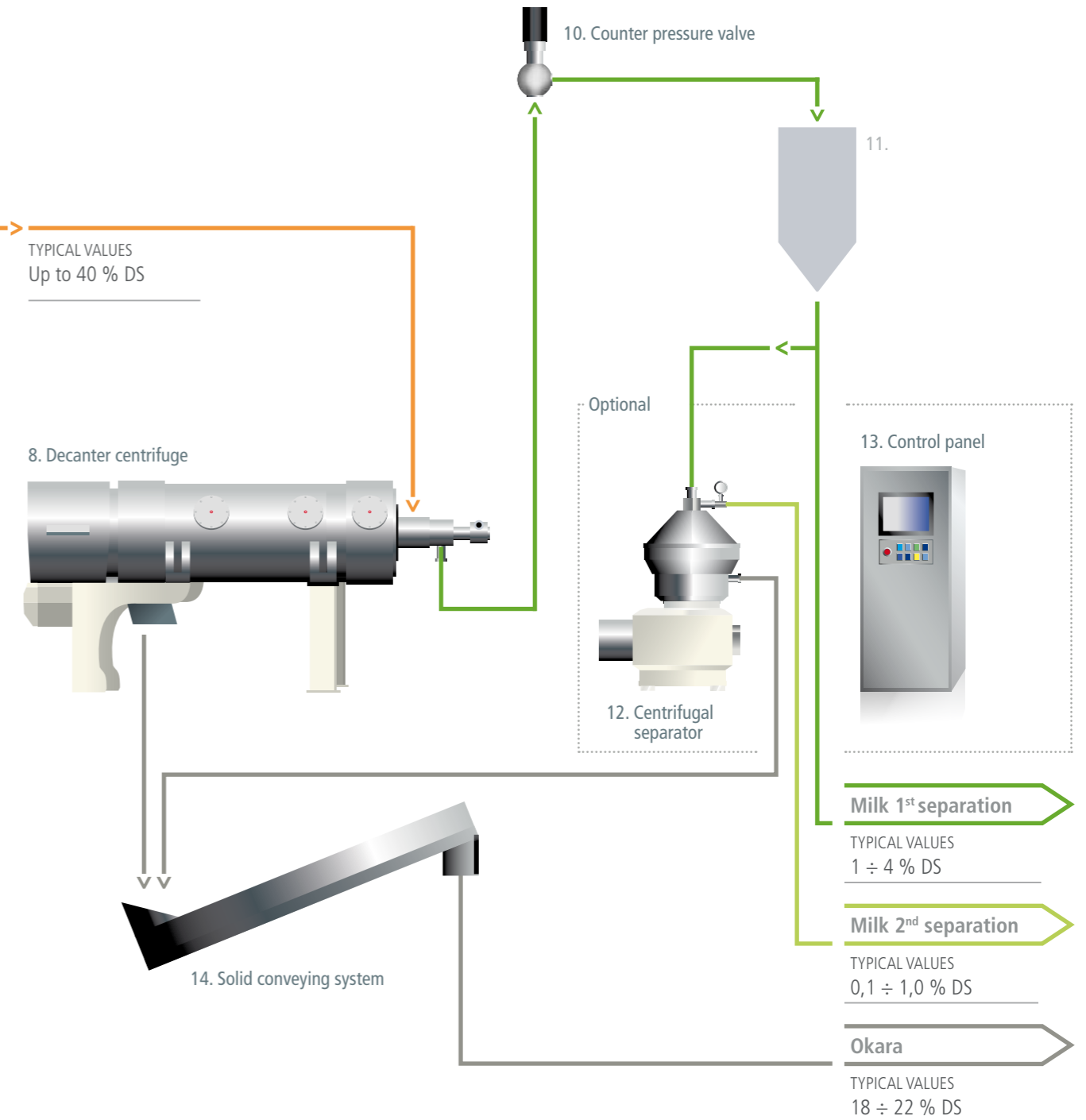
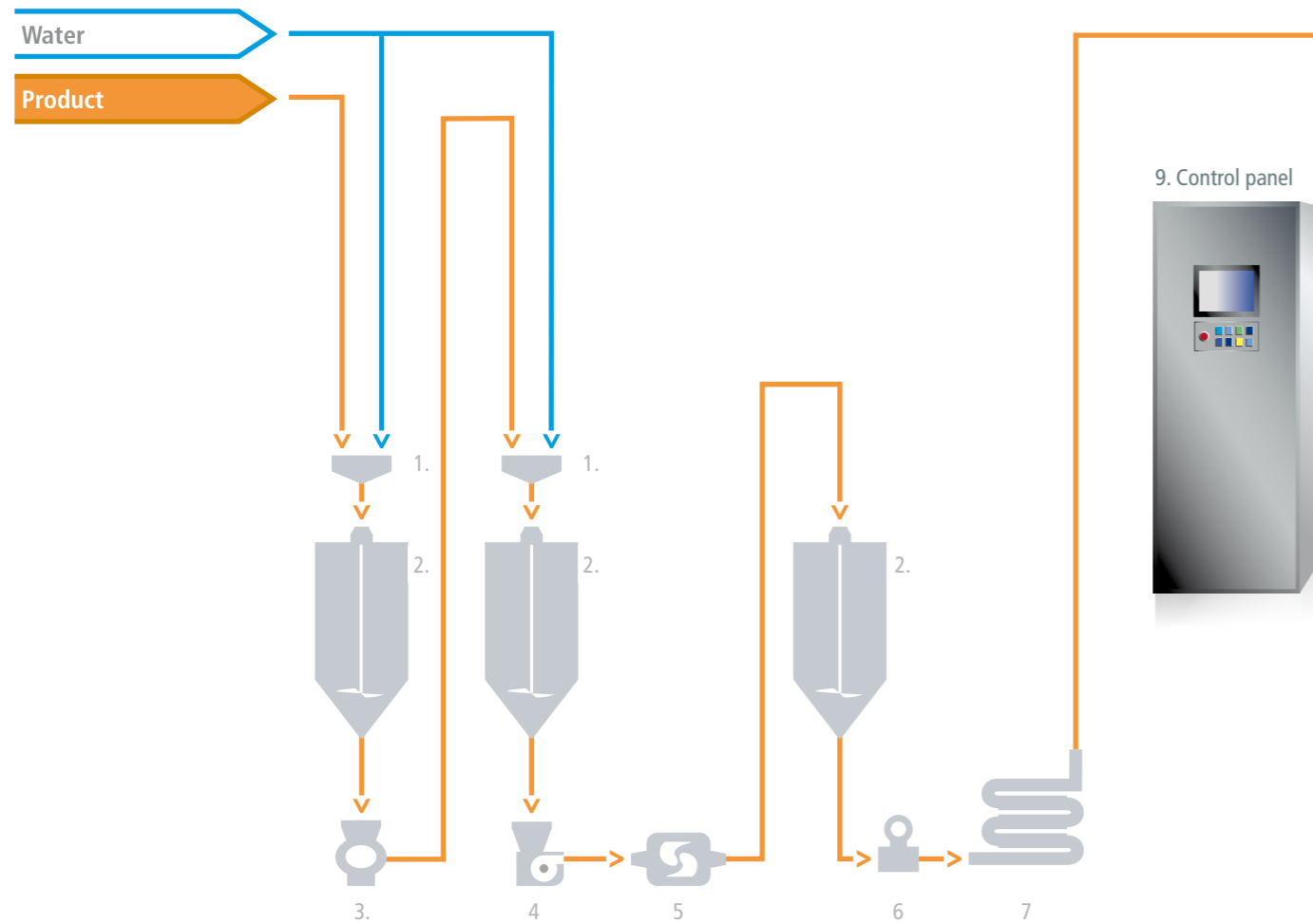


4
Oat
Milk





1st and 2nd Separation Phase



A complete line for a plant milk clarification plant consists of the following components:

- 1 . Dosing system
- 2 . Mixer
- 3 . Mill
- 4 . Pump
- 5 . Homogenizer
- 6 . Flow meter
- 7 . Heat exchanger

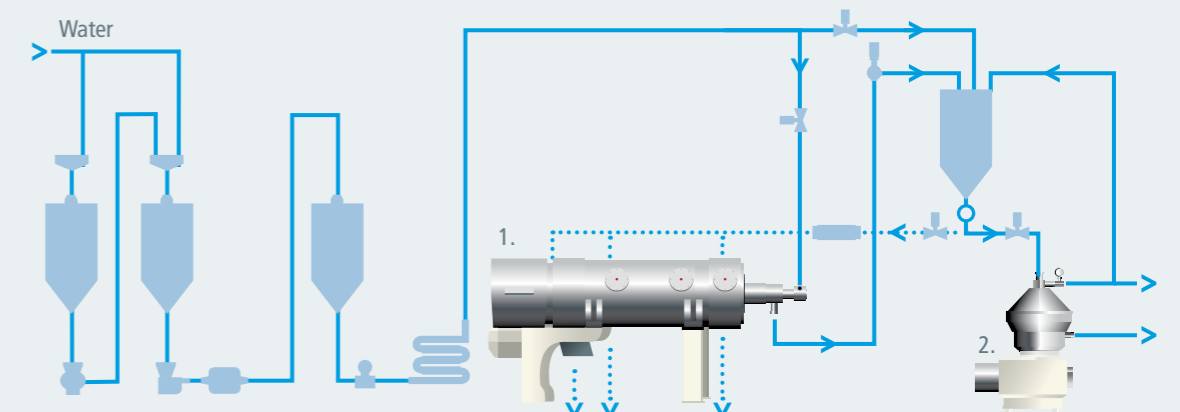
- 8 . Decanter centrifuge
- 9 . Decanter centrifuge control panel
- 10 . Counter pressure valve
- 11 . Tank
- 12 . Centrifugal separator
- 13 . Centrifugal separator control panel
- 14 . Solid conveying system

CIP washing system

1. Decanter centrifuge
2. Centrifugal separator

Inner bowl washing circuit

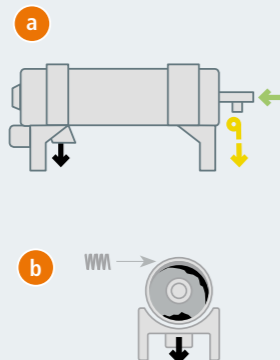
External bowl washing circuit





Decanter centrifuge (CPA series)

Pieralisi decanter centrifuges are based on a modern technology that combines the ability of treating high solids content products with an excellent clarification efficiency. Separation performances are related not only to mechanical details but also to operating parameters (centrifugal force, flow rate, differential speed, liquid levels) and to the specific characteristics of the product (density, viscosity, quantity and dimension of solid particles). A main motor connected to the decanter shaft drives the bowl rotation. The extremely high centrifugal force generated inside the bowl is proportional to the rotational speed and to the bowl diameter. The product to be clarified enters through the feeding pipe, it passes in the diffuser to be distributed at the centre of the bowl and then it is accelerated. The centrifugal force acting on the solid particles is responsible for the solid-liquid separation. Every decanter centrifuge can be tailored to any specific application, selecting between the different available configurations, components and devices. The centripetal pump (a) and the solid scraper (b) are the most common systems used in food applications.



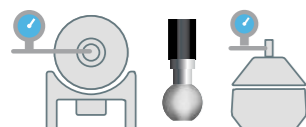
Adjustable Centripetal Pump **a**

In order to satisfy the specific needs of some applications and provide better performances and greater operating flexibility, Pieralisi has developed a special device called Adjustable Centripetal Pump (CPA), that allows to discharge the clarified liquid from the bowl. The use of the centripetal pump, integrated in the decanter liquid side terminal, permits to have the clarified liquid outlet under pressure, minimizing the contact with the air and the consequent oxidation phenomena or foam formation. Another specific advantage of the centripetal pump is to allow the continuous regulation of liquid exit level during operation; this option bestows to the decanter a great versatility, which results essential for an optimal management of the performances mainly in presence of products with variable concentrations and characteristics. The centripetal pump uniqueness and peculiarities make Pieralisi's CPA decanters particularly fit for the food industry, above all in the beverage sector. Pieralisi's CPA centrifuges are available in both 2 or 3 phases version.

Solid scraper device **b**

The dehydrated solid that is stockpiled on the bowl internal walls, is transported by a scroll and continuously emptied towards the side opposite to the liquid exit. In order to avoid the dehydrated solid accumulation and to guarantee a regular discharge, a specific device (solid scraper) can be installed in the solid chamber. This device is automatically activated on the base of the parameters set by the operator on the control panel.

Back pressure valve



In presence of liquid discharged by means of the centripetal pump, it is possible to control the clarified liquid pressure through a dedicated control valve (manual or automatic). The aforementioned regulation, besides sending the product to a certain distance from the discharge point without using any external pump, it significantly contributes to a more precise control of the clarified liquid quality that is obtained from the separation process.

Solid conveying system



The solid exiting from the decanter can be discharged by gravity in an underlying container or it can be moved in a lateral one, using an adequate horizontal or inclined scroll conveying system. The main control panel can handle every single component of the system, it automatically activates the start and stop sequences, in relation to the centrifuge effective working conditions. The Pieralisi's decanter unique design allows installing the conveyor directly under the solid exit without any further civil work.



Centrifugal separator

Pieralisi vertical centrifuges represent the perfect technological solution to complete the separation process done with horizontal decanters. Vertical separators, taking advantage of their extremely high rotational speed, can reach centrifugal force values up to 10.000 g, far higher than decanters can reach. This very high centrifugal force is the key element that allows the separators to remove the solid particles that have not been grabbed in the previous separation steps, generating a highly pure clarified liquid. In addition in this case the reachable performances are linked to many factors, both constructive (disc type and design, inside volumes, liquid discharge levels and devices) and operative (flow rate, characteristic of the product, solid quantity and type, temperature). Pieralisi centrifugal separators for dairy products are specifically developed to reach the clarified milk maximum quality, by using internal components designed to remove also the smallest solid particles. The product to be clarified enters into the top of the separator through the feeding tube, it is successively undergone to centrifugal force and then it is forced to pass through the hundreds of internal discs. The combined action of the centrifugal force together with the presence of the internal discs leads to the separation of the solid particles that are deposited on the bowl wall, where these are discharged in an automatic and intermittent way. The clarified liquid centrally climbs back towards the top of the bowl and it continuously exits through the centripetal pump. The discharge by means of the centripetal pump permits, as for decanters, to have a stream on pressure, to avoid the air contact and the consequent possible oxidation and to minimize the foam formation.

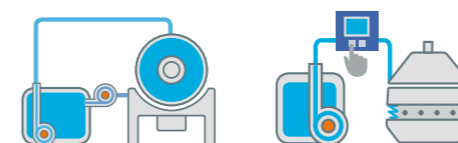
Electrical and control panel

"Pieralisi Control System" is divided in two main sections: power and control. The main switches and the variable frequency drives (VFD) for both decanter, separator and auxiliaries are placed in the power side. The control module is based on the latest generation PLC and HMI with a touch screen panel. A dedicated software, designed by Pieralisi automation department, is embedded in the PLC to automatically control the whole separation plant during each operating phase: start-up, duty, flushing, shutdown and emergency. The HMI allows navigating through several areas:

- separation process monitoring
- operating parameters control
- alarms detection and interlocks
- main parameters trend display

The last control release optimizes the separation performances and stabilizes the operation conditions by controlling the **decanter centrifuge** in "torque mode". The logic is continuously calculating the torque on the decanter scroll, keeping it stable at its set point value, by smoothly acting on the scroll differential speed. The PLC automatically handles and controls the **centrifugal separator** in each operating step (start-up, duty, discharge, flushing and shutdown), monitors the main parameters and effectively manages any anomaly or emergency. All Pieralisi control panels can be equipped with a dedicated module suitable for remote connection, supervision, diagnostics and support. Upon request, only the control unit (TCP) can be supplied: this solution does not consider the possibility to control the auxiliaries and does not have the electrical section with VFD and breakers.

CIP washing system



In the food industry, the requirements of hygiene and cleanliness of the machineries are very restrictive and therefore they are absolutely unavoidable. Pieralisi centrifuges (both decanters and separators) are provided with a reliable and efficient CIP washing system (Clean in Place), that is automatically run from the control panel and can be set depending on every single process need. Two specific washing sequences are automatically started and handled by the control panel at the end of every operation cycle or in case of necessity. A number of dedicated solenoid valves, conveniently installed in the washing

circuit, allows to feed the washing liquid in various points, both inside the rotating assembly and in its external part, between bowl and case. The CIP washing procedure, besides being a fundamental requisite to fulfill the food industry regulation, it represents a primary element in order to preserve the functionality of each single component of the separation unit and to maintain the highest level of reliability and performances in the course of time.

Configuration Table



Decanter Centrifuge (serie CPA)

			Soy Milk	Almond Milk	Rice Milk	Oat Milk
			1	2	3	4
ROTATING ASSEMBLY	Bowl	Shallow cone				
		Inner surface with liners				
		Inner surface with grooves				
		Wear protection solid discharge bushings (replaceable)				
	Scroll	Single flight				
		Variable pitch flight				
		Flight with windows				
		Flight wear protections: sprayed tungsten carbide				
MATERIALS	Bowl and Scroll	SAF 2205 Duplex				
		AISI 316 stainless steel				
		Stainless steel cylindrical body				
		Stainless steel solid-liquid chambers				
	Case	Stainless steel subframe				
		Painted carbon steel subframe				
		Stainless steel				
		Tailored on the application and international standards				
EXECUTION	Installation area	Safe area				
LUBRICATION	Gearbox	Oil bath (tailored on the FDA specifications)				
	Bearings	Automatic greasing (grease tailored on the FDA specifications) ▶ 03				
PROCESS CONFIGURATION	Liquid outlet	Interchangeable liquid outlet levels				
		Liquid discharge level adjustable during operation (CPA) ▶ 01				
DRIVES	Bowl drive	Electric motor				
		Fixed differential speed				
		Electric motor (back drive)				
DECANTER OPTIONS	Scroll drive	Hydraulic motor				
		Control panel				
		Counter pressure valve				
		Cooling fan				
	Kits and Systems	Solids scraper device				
		Cip washing system ▶ 02				
		Filtering unit				
		Solid conveying system				
PLANT OPTIONS	Kits and Systems	Feeding pump				
		Flow rate measurement kit				
		Heating system				

Centrifugal Separator

PROCESS CONFIGURATION	Liquid discharge	Single outlet under pressure				
	Solid discharge	Manual				
		Automatic				
MATERIALS	Type of separation discs	Clarifier				
	Bowl	SAF 2205 Duplex				
	Cover	Stainless steel				
	Frame	Cast iron with stainless steel inner protection				
PROTECTION		Stainless steel ▶ 04				
	Wet parts	Stainless steel				
	Gaskets	Tailored on the application and international standards				
	Seal	High wear and corrosion resistant				
TRANSMISSION	Type	With wear and corrosion special protection system				
		Gears				
		Belts				
EXECUTION	Lubrication	Oil bath (tailored on the FDA specifications)				
		Oil with forced circulation cooling system				
EXECUTION	Installation area	Safe area				
INSTALLATION	Type	Stand alone separator with vibration absorber and anchor device				
		Separator on stainless steel base				
		Stainless steel skid equipped with control panel and auxiliary units				
SEPARATOR OPTIONS	Kits and Systems	Control panel				
		Manual activation of the solid discharge				
		Automatic activation of the solid discharge				
		Cip washing system				
PLANT OPTIONS	Kits and Systems	Filtering unit				
		Constant level feeding system				
		Feeding pump				
		Flow rate measurement kit				

