

# Separation in the Dairy Industry



## Efficient and cost-effective separation and clarification

Current and evolving customer needs always come first at Seital Separation Technology. Via close collaboration with our customers, an innovative approach and cutting-edge R&D we design, develop and deliver best-in-class separation solutions for the dairy industry that provide superior quality and yield at the lowest possible cost.

Features	Benefits
<ul style="list-style-type: none"> <li>Simple mechanical design and construction, easy to maintain</li> </ul>	<ul style="list-style-type: none"> <li>Low maintenance time and cost</li> </ul>
<ul style="list-style-type: none"> <li>Skidded solution</li> </ul>	<ul style="list-style-type: none"> <li>Short installation time and cost savings</li> </ul>
<ul style="list-style-type: none"> <li>Remote monitoring</li> </ul>	<ul style="list-style-type: none"> <li>Higher uptime, on-time operational diagnostics</li> </ul>
<ul style="list-style-type: none"> <li>Wide range of models</li> </ul>	<ul style="list-style-type: none"> <li>Low investment needed</li> </ul>
<ul style="list-style-type: none"> <li>Low-noise</li> </ul>	<ul style="list-style-type: none"> <li>Improvement in operator's working conditions</li> </ul>
<ul style="list-style-type: none"> <li>Hygienic fluid handling while processing</li> </ul>	<ul style="list-style-type: none"> <li>Low contamination risk</li> </ul>

## Applications

### Warm milk skimming

Milk skimming during pasteurisation is the most common centrifugal separator application in dairies. The purpose of the skimming process is to separate the raw milk into skim milk and cream. The product temperature should normally be kept between 45°C and 55°C (113 and 131°F) in order to ensure optimal skimming efficiency. Skimming efficiency is influenced by the transport of whole milk, milk storage temperature and time, seasonal variation, milk quality, mechanical treatment and free air-content upstream from the separator.

Skimming efficiency is expressed as residual fat content in the skimmed milk. At rated capacity, Seital separators generally give a residual fat content in the range of:

- 0.03 - 0.05% measured by Gerber method
- 0.040 - 0.055% measured by Röse-Gottlieb method



Dairy - Milk separator with automatic milk and cream standardization system

### Self-cleaning warm milk separators

MODELS	SKIMMING CAPACITY l/h (Gal/h)	STANDARDISATION CAPACITY l/h (Gal/h)	MOTOR POWER kW (HP)
SE12A	1,200 (317)	2,000 (528)	4 (5)
SE13	2,000 (528)	3,000 (793)	5.5 (7)
SE15	3,500 (925)	5,000 (1320)	7.5 (10)
SE20	5,000 (1320)	8,000 (2113)	11 (15)
SE30A	7,000 (1849)	10,500 (2774)	15 (20)
SE35	10,000 (2642)	14,000 (3698)	18.5 (25)
SE40	12,000 (3170)	18,000 (4755)	18.5/22 (25/30)
SE45	15,000 (3963)	20,000 (5283)	22 (30)
SE50	17,000 (4491)	25,000 (6604)	30 (40)
SE60	20,000 (5283)	30,000 (7925)	30 (40)
SE70	25,000 (6604)	35,000 (9246)	37 (50)
SE75	30,000 (7925)	40,000 (10567)	37/45 (50/)
SE75S	35,000 (9246)	45,000 (11888)	45 (60)
SE80	40,000 (10567)	48,000 (12680)	45 (60)
SE85	45,000 (11888)	52,000 (13737)	45/55 (60/74)



### Cold milk skimming

Cold milk separation at > 4 °C (39.2 °F) takes place in a number of processes including:

- cheese making process using unpasteurised milk
- pre-standardisation process (avoiding double heating treatment)
- high-quality cream production.

Cold milk separation enables significant savings in energy and thermal equipment such as heat exchangers. Cold milk skimming efficiency is lower than for warm milk, and cream concentration cannot exceed 40-42 %. Skimming efficiency improves by increasing temperature and/or reducing flow-rate. Viscosity and other cream characteristics at low temperature require the use of a special hermetic separator.

### Milk clarification

In many cases milk must be clarified on reception of the dairy to remove particulates of dirt and somatic cells such as Leucocyte. This will reduce the presence of Listeria which is trapped inside the leucocyte.

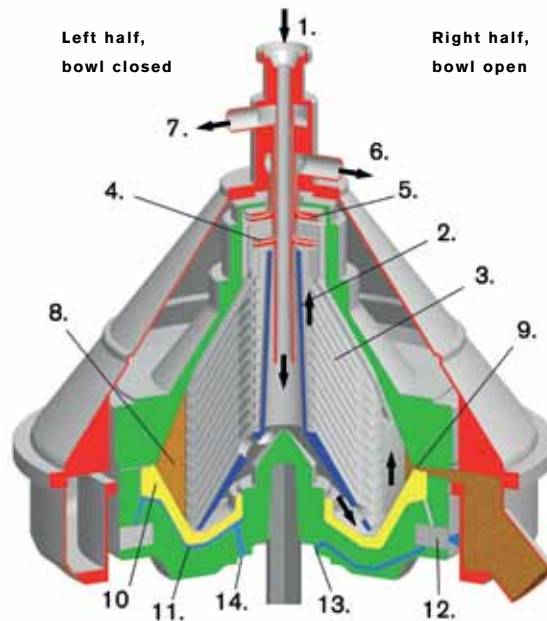
The milk clarifier can operate with cold or warm milk. However, clarification efficiency improves at higher temperatures.

Centrifuges for milk separation (skimming) also perform clarification, but their efficiency is low compared with milk clarifiers.

### Self-cleaning cold milk separators

MODELS	SKIMMING CAPACITY l/h (Gal/h)		MOTOR POWER kW (hp)
	*rf<0.10%	*rf<0.25%	
SE20HF	2,000 (528)	5,000 (1321)	15 (20)
SE40HF	5,000 (1321)	10,000 (2642)	22 (30)

\* rf = RESIDUAL FAT IN THE SKIM



- |                                 |                       |  |
|---------------------------------|-----------------------|--|
| 1. Product inlet                | 6. Heavy phase outlet | 11. Water closing chamber                  |
| 2. Distributor                  | 7. Light phase outlet | 12. Bowl valve                             |
| 3. Disk stack                   | 8. Solids/impurities  | 13. Operating water inlet for bowl opening |
| 4. Light phase centripetal pump | 9. Discharge holes    | 14. Operating water inlet for bowl closing |
| 5. Heavy phase centripetal pump | 10. Moving ram        |  |

### Self-cleaning milk clarifiers

MODELS	CLEANING CAPACITY l/h (Gal/h)	MOTOR POWER kW (hp)
SE11SM	2,500 (660)	4 (5)
SE11	5,000 (1321)	5.5 (7)
SE16	8,000 (2113)	7.5 (10)
SE21	12,000 (3170)	15 (20)
SE25	15,000 (3963)	18.5 (25)
SE31	20,000 (5283)	18.5 (25)
SE41	25,000 (6604)	22 (30)
SE46	30,000 (7925)	30 (40)
SE51	40,000 (10567)	37 (50)
SE61	50,000 (13209)	45 (60)
SE71	65,000 (17172)	55 (74)



## Automatic milk and cream standardisation

An original system developed by SPX, the Seital Series Se-St automatic standardisation unit employs a highly accurate Coriolis-type meter to provide the density of the cream coming out of the separator. The unit automatically controls separator output parameters such as skim back-pressure and cream concentration and features a touchscreen interface for adjustment of the fat quantity in milk and cream based on recipes set by the operator. The unit is available as a stand-alone module that can be connected to an existing separator or integrated in the same skid of a new separator.



### Working range and accuracy:

- Standardised cream: 25-45% fat content
- Cream accuracy: +/- 0.2%
- Standardised milk: from 0.5% up to raw milk fat content - 0.2%
- Milk accuracy: 0.03-0.05%

### Capacities

- Milk and cream standardisation: from 5,000 l/h to 50,000 l/h (1321 to 13209 Gal/h)

### Milk bacteria clarification

Milk bacterial clarifiers are essentially used to improve quality in drinking milk and cheese production. The general reduction of the amount of bacteria and the important reduction in aerobic spores, anaerobic spores and listeria mean that pasteurisation temperatures can be reduced. Milk bacteria clarification also helps avoid problems during cheese aging, and improves shelf life and organoleptic properties of the milk.

The milk bacteria clarification process can be performed in one of the following ways:

- continuous extraction of bacteria in the concentrated milk flow that must be sterilised before re-use
- extracted concentrate recycling in the feed and bacteria minimization by using only partial discharges

The first method results in minimum milk losses, but requires a more complex and expensive treatment. The second method is the best compromise between installation costs, product quality and milk loss.

### Milk bacteria clarifiers

MODELS	MAXIMUM CAPACITY l/h (Gal/h)	MOTOR POWER kW (hp)
SE155B	3,000 (793)	9.2 (12)
SE205B	6,000 (1585)	15 (20)
SE305B	8,000 (2113)	15 (20)
SE355B	10,000 (2642)	18.5 (25)
SE405B	12,000 (3170)	22 (30)
SE455B	15,000 (3963)	22 (30)
SE505B	17,000 (4491)	30 (40)
SE605B	20,000 (5283)	37 (50)
SE705B	25,000 (6604)	37 (50)
SE755B	30,000 (7925)	45 (60)
SE805B	40,000 (10567)	45 (60)
SE855B	45,000 (11888)	55 (74)



## Whey processing

Centrifugal separators play a fundamental role in whey processing by recovering fat from whey and/or preparing it for concentration.

### Whey clarification

The main purpose of whey clarification is to remove curd fines in order to enable the highest possible efficiency in the subsequent fat separation process. The best way to reduce cheese fines is by using a centrifugal clarifier.

#### Self-cleaning whey clarifiers

MODELS	CLEANING CAPACITY I/h (Gal/h)	MOTOR POWER kW (hp)
SE11SM	2,500 (660)	4 (5)
SE11	5,000 (1321)	5.5 (7)
SE16	8,000 (2113)	7.5 (10)
SE21	12,000 (3170)	15 (20)
SE25	15,000 (3963)	18.5 (25)
SE31	20,000 (5283)	18.5 (25)
SE41	25,000 (6604)	22 (30)
SE46	30,000 (7925)	30 (40)
SE51	40,000 (10567)	37 (50)
SE61	50,000 (13209)	45 (60)
SE71	65,000 (17171)	55 (74)

### Whey separation

Fat separation from whey is similar to fat separation from milk. Whey contains small amounts of fat, usually between 0.15 and 0.70 %. Fat separation is easier than from milk as long as the quantity of curd fines is low. The processing temperature is usually between 30 and 40°C. (86 and 104°F)

A combination of discharges is usually performed in order to maintain high separation efficiency. Skimming efficiencies between 0.03 and 0.04% residual fat content can be achieved.

#### Self-cleaning whey separators

MODELS	SKIMMING CAPACITY I/h (Gal/h)	MOTOR POWER kW (hp)
SE12A	2,000 (528)	4 (5)
SE13	3,000 (793)	5.5 (7)
SE15	5,000 (1321)	7.5 (10)
SE20	8,000 (2113)	11 (15)
SE30A	10,500 (2774)	15 (20)
SE35	14,000 (3698)	18.5 (25)
SE40	18,000 (4755)	22 (30)
SE45	20,000 (5283)	22 (30)
SE50	25,000 (6604)	30 (40)
SE60	30,000 (7925)	30 (40)
SE70	35,000 (9246)	37 (50)
SE75	40,000 (10567)	45 (60)
SE75S	45,000 (11888)	45 (60)
SE80	48,000 (12680)	45 (60)
SE85	52,000 (13737)	55 (74)





# Cream and butter oil processing

## Cream concentrators

Cream concentration is a common task in the Dairy Industry. Seital Separation Technology offers specific units enabling:

- production of high-fat cream
- minimising of residual fat in the resulting buttermilk

High-fat cream can be the first part of the processing for butter oil production or the starting point for alternative butter production.

## Oil purifiers for butter oil concentration and polishing

When mechanical energy is applied to high-fat cream, phase inversion takes place. The cream from a stable milk fat emulsion becomes a mixture of oil and butter serum that can be processed in two stages in order to produce butter oil. The first step is to use an oil purifier to remove as much butter serum as possible from a 70-80% oil concentrate. An oil polisher is then used to produce butter oil ready for vacuum drying.



## Self-cleaning cream concentrators

MODELS	MIN. CAPACITY l/h (Gal/h)	MAX. CAPACITY l/h (Gal/h)	MOTOR POWER kW (hp)
SE12AC	400 (106)	600 (159)	4 (5)
SE13C	500 (132)	1,000 (264)	5.5 (7)
SE15C	1,000 (264)	2,000 (528)	7.5 (10)
SE20C	1,500 (396)	2,500 (660)	11 (15)
SE30AC	2,000 (528)	3,500 (925)	15 (20)
SE35C	3,000 (793)	5,000 (1321)	18.5 (25)
SE40C	3,500 (925)	6,000 (1585)	18.5 (25)
SE45C	4,500 (1189)	7,500 (1981)	22 (30)
SE50C	5,000 (1321)	8,500 (2245)	30 (40)
SE60C	6,000 (1585)	10,000 (2642)	30 (40)
SE70C	7,500 (1981)	12,500 (3302)	37 (50)
SE75C	9,000 (2378)	15,000 (3963)	37 (50)
SE75SC	10,500 (2774)	17,500 (4623)	45 (60)
SE80C	12,000 (3170)	20,000 (5283)	45 (60)
SE85C	13,500 (3566)	22,500 (5944)	45 (60)

\*Min/max capacities are based on a feed of cream 40%

## Self-cleaning butter oil concentrators and purifiers

MODELS	OIL CONCENTRATION kg/h (lb/h)	OIL PURIFICATION kg/h (lb/h)	MOTOR POWER kW (hp)
SE122BO	750 (1653)	500 (1102)	5.5 (7)
SE302ABO	1,500 (3307)	1,000 (2205)	11 (15)
SE452BO	3,000 (6614)	2,000 (4409)	22 (30)
SE602BO	4,500 (9921)	3,000 (6614)	30 (40)
SE802BO	7,000 (15432)	4,500 (9921)	45 (60)

# Small dairies

## Solid-retaining separators and clarifiers

Solid-retaining (manual cleaning) milk/whey clarifiers, and warm milk and whey skimming separators are also available. The solid impurities present in the product are collected in the internal periphery of the bowl. Solids retaining centrifuges must be stopped and cleaned manually at the end of the production shift.

## Solid-retaining milk and whey clarifiers

MODELS	CLEANING CAPACITY l/h (Gal/h)	MOTOR POWER kW (hp)
SE03.1	1,500 (396)	1.5 (2)
SE05.1	3,000 (793)	1.85 (2.4)
SE06.1	4,500 (1189)	4 (5)
SE07.1	6,000 (1585)	5.5 (7)
SE09.1	7,500 (1981)	7.5 (10)

## Solid-retaining milk and whey separators

MODELS	MILK SKIMMING CAPACITY l/h (Gal/h)	WHEY SKIMMING CAPACITY l/h (Gal/h)	MOTOR POWER kW (hp)
SE03.0	750 (198)	1,050 (277)	1.5 (2)
SE05	1,200 (317)	1,800 (476)	1.85 (2.4)
SE06	2,000 (528)	3,000 (793)	4 (5)
SE07	3,000 (793)	4,500 (1189)	5.5 (7)
SE09	5,000 (1321)	7,500 (1981)	7.5 (10)

## Quality and safety

SPX manufactures all performance-critical components including machining the bowls and parts that define separation efficiency, quality and safety at its facility in Santorso. All components are manufactured according to internal fabrication standards, many of which exceed those laid down by code requirements for non-destructive testing.

### Materials

Centrifuge components are precision-made using the highest quality stainless steel, special alloys, titanium and other high-grade materials. Our engineering specialists at our Santorso factory possess a complete range of design, manufacturing and assembly expertise.

### Quality engineering and control

- Optimisation of structural and dynamic design using advanced design technology
- Optimisation of product fluid-dynamic through new vertical disk stack design
- Cutting-edge manufacturing and quality control systems

### Service and support for maximum output

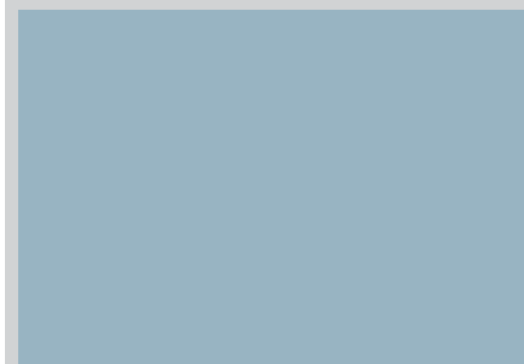
- Maintenance and troubleshooting – to avoid costly downtime
- Rapid delivery of original spare parts – reliability for longer service life
- Remote monitoring – fast problem solving

### Knowledge partnership to keep you ahead

- Application testing and process optimisation – higher revenues at lower cost
- R&D expertise – new product development addressing evolving demand
- Operator training – greater efficiency, minimum human error

### Efficiency and safety

SPX employs a detailed manufacturing and inspection plan for critical manufacturing phases, using a specific dynamic rotor balancing procedure. Testing includes 3D measurement, dye penetrant, ultrasonics and hydraulic test as well as destructive testing, X-ray and metallographic tests. Component stress and strain analysis is performed using advanced Finite Elements Method Analysis software while efficiency testing is conducted using CFD (Computational Fluid Dynamics).



# Clarification and Separation in the Dairy Industry



Based in Charlotte, North Carolina, SPX Corporation (NYSE: SPW) is a global multi-industry manufacturing leader. For more information, please visit [www.spx.com](http://www.spx.com)

## **SPX FLOW TECHNOLOGY SANTORSO S.R.L.**

Seital Separation Technology

Via delle Prese, 14

36014 Santorso (VI)

Italy

T: +39 0445 540 232

F: +39 0445 540 214

E: [ft.seital.sales@spx.com](mailto:ft.seital.sales@spx.com)

[www.spx.com](http://www.spx.com) / [www.seital.com](http://www.seital.com)

SPX reserves the right to incorporate our latest design and material changes without notice or obligation.

Design features, materials of construction and dimensional data, as described in this bulletin, are provided for your information only and should not be relied upon unless confirmed in writing. Please contact your local sales representative for product availability in your region. For more information visit [www.spx.com](http://www.spx.com).

SST-101-GB Version: 03/2015 Issued: 04/2015

COPYRIGHT © 2013, 2015 SPX Corporation