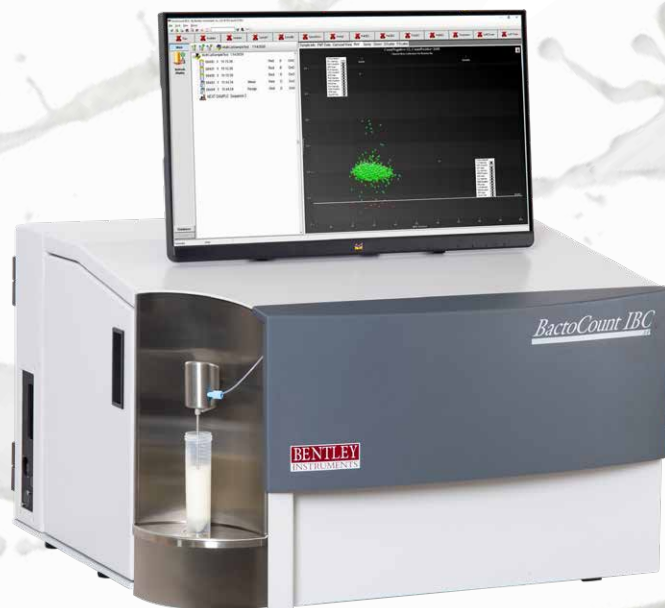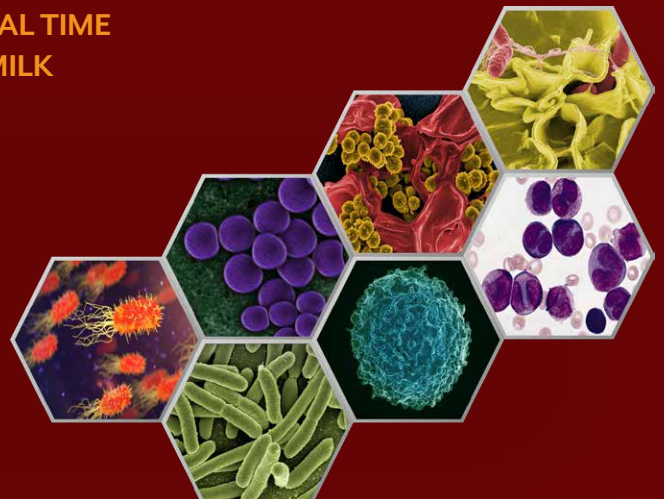# BENTLEY INSTRUMENTS

BACTOCOUNT IBC_M 3.0

THE WORLD'S FASTEST COUNTER FOR THE ACCURATE AND RELIABLE ENUMERATION OF

INDIVIDUAL BACTERIA & SOMATIC CELLS

IN RAW MILK

THE WORLD'S FASTEST FLOW CYTOMETER FOR THE REAL TIME DETERMINATION OF THE HYGIENIC QUALITY OF RAW MILK

The BactoCount IBC_M 3.0 is a semi-automated instrument that uses a proprietary process based on next-generation flow cytometry for the rapid, highly accurate, reliable and multiplex enumeration of individual bacteria and somatic cells in raw milk.

The rapid test for bacteria and somatic cells makes it the ideal solution for any processing plant or laboratory involved in the quality assessment of milk.

INNOVATIVE ANALYTICAL & AUTOMATION SOLUTIONS FOR THE DAIRY INDUSTRY

BactoCount IBC$_M$ 3.0

What's New?

30 years ago Bentley Instruments was the first to implement Flow Cytometry for bacteria and somatic cells counting in raw milk. Since then, we have continued to innovate and improve our know-how in order to provide a unique solution to characterize completely and in real time the hygienic quality of raw milk.

The new BactoCount IBC$_M$ 3.0 Multiplex platform completely opens up the field of applications for the in-depth scrutiny of milk bacteriological and somatic cells composition to improve milk quality, safety monitoring and the early diagnosis of mastitis.

The BactoCount IBC$_M$ was fully redesigned to provide a unique, completely open and adaptable platform for a wide range of potential applications. The new BactoCount IBC$_M$ 3.0 offers multiplexed real-time analysis of total flora and somatic cells in raw milk at a speed up to 50 analysis/hour, and much more to come.

- Modular Design
- Up to 2 Lasers (16 $\lambda \neq$)
- Up to 4 Detectors
- Up to 50 analysis/hour
- SCC/IBC analysis

What does it mean for you?

Analytical advantages

- Real-time and highly accurate determination of raw milk hygienic quality in compliance with ISO 16140 standard,
- Unique solution for multiplex testing,
- Highly standardized and reproducible method guaranteeing worldwide results equivalence across laboratories and countries,
- Highly accurate and robust universal conversion equation based on a very large and representative samples database,
- Excellent instrument standardization and quality control with our long shelf-life lyophilized standards (IBC and SCC) and microspheres working solution.

Hardware & Software advantages

- Proprietary robust flow cytometer built on well-proven technology,
- Automated sample preparation,
- Easy-to-use, low-maintenance design,
- Extensive Internet remote control capabilities,
- Centralized database,
- Low cost of ownership,
- Customizable interface depending on your applications.

Powerful to enhance milk value

- Milk payment, screening and segregation,
- Enable dairies to comply with EU Commission Regulation (EC) n° 1622/2006 laying down specific hygiene rules for food of animal origin, -> total flora < 100 000 cfu/mL, SCC < 400 000 cells/mL,
- Real-time detection of milk tanker contamination before unloading,
- Real-time detection of milk silo contamination before processing,
- Segregation of the milk as a function of its quality,
- Improve end-products consistency,
- Fast return on investment.

BactoCount vs. ISO 4833
Universal Conversion Equation (ISO 21187)

9735 raw milk samples analyzed over 11 years, 22 BactoCount

$$y = 0,9814x - 0,4667$$
$$R^2 = 0,8256$$
$$Sy,x = 0,32 \log < 0,40 *$$
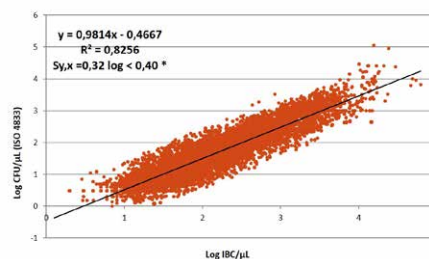
Brazil, Czech Republic, Denmark, Estonia, France, Germany, Poland, Finland, Ireland, Italy, Japan, Lithuania, Switzerland, Turkey, USA

● Fast ● Easy ● Accurate ● Guaranteed ROI ●

BactoCount's
Modules

1

Computer

A powerful industrial computer allows the IBC$_M$ to run and monitor the instrument at all times. Diagnostic features have been integrated in the software to warn the operator if the instrument is not functioning optimally. In addition, all of the analytical data and raw detector output are saved in a database and can be recalled at any time either for retroactive data analysis or recalculating data after calibration.
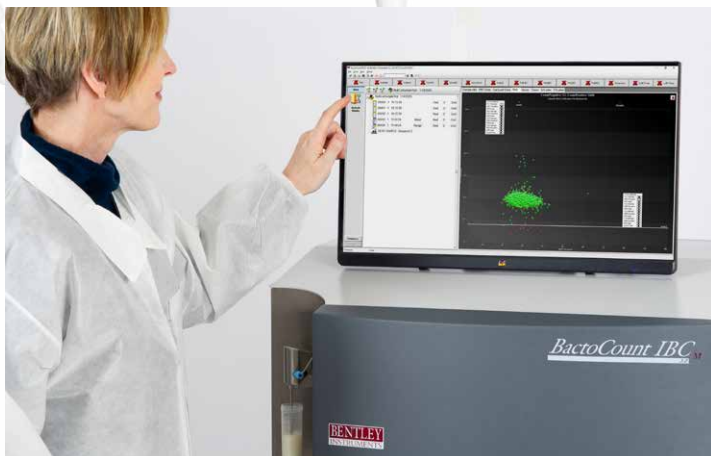
2

Fluid Handling

The fluid handling station is an enclosed module designed to filter and monitor the level of the reagents used by the instrument in real-time. Sensors are continuously monitored by the computer, allowing it to warn the operator when fluid levels are low. This module also contains an easily accessible filtration station, which uses in-line filters (0.1 μm), well below the accepted standard for sterile filtering, to remove any possible outside contamination from all reagents.

3

Open Incubator/Sonic probe

The incubator consists of a carousel equipped with 17 wells regulated at 50°C. The milk and a proprietary incubation reagent are automatically dispensed into the wells and may be subjected to mechanical, chemical and heat treatment. During the incubation, the mixture can be sonicated to remove potential interfering components and stain the bacteria DNA and/or RNA with a fluorescent marker.

The use of an ultrasonic probe is an important feature for bacteria counting applications. The cavitation effect removes potential interfering components such as somatic cells and gives the method its high sensitivity and Signal-to-Noise ratio. The carousel is automatically cleaned before and after each analysis to eliminate carry-over. The carousel can also be easily removed from the instrument for a more thorough cleaning if necessary.

4

Industrial Flow Cytometer

The flow cytometer, also known as the counting assembly, includes the flow cell, microscope, narrow band filter, and one or two powerful and highly stable solid-state laser(s) and highly sensitive photomultiplier(s). The laser excites the fluorescent marker that is intercalated into the DNA and/or RNA. The fluorescence output is then collected with optics, filtered with the narrow band filter, and detected with the photomultiplier(s). The intensity and width of the fluorescence pulses are recorded and used as gating parameters. A calibration or conversion equation can be applied to convert instruments' gated pulses into the relevant reference method's official unit. The flow cytometer is compact, completely closed and temperature regulated to provide optimum stability.

But wait... Flow cytometry?

Flow cytometry is a technique use to rapidly characterize and enumerate populations of bacteria, somatic cells and other particles contained in a liquid matrix.

BactoCount IBC$_M$ Technical Overview & Principle of Operation

For total flora analysis:

· An incubation reagent consisting of a clarification buffer, a proteolytic enzyme, and a fluorescent marker is added to the milk in order to lyse the somatic cells, solubilize the fat globules and proteins, permeabilize the bacteria and stain their DNA.

· The fluorescent marker intercalates rapidly and selectively into all the bacteria double-stranded nucleic acid.

· The mixture is sonicated during the incubation period to help the chemical breakdown of the interfering particles, disrupt the remaining bacteria colonies to improve the detection of individual bacteria and reduce the background fluorescence.

· After the incubation period, a portion of the incubation mixture is transferred to the flow cytometer where the bacteria are aligned and exposed to an intense laser beam and fluoresce.

· The fluorescent signal is collected by the optics, filtered, and detected with a photomultiplier.

· The intensity and height of the fluorescent pulses are recorded and used as gating parameters.

· The sorted pulses (IBC) are then converted into Colony-Forming Units (CFU) after the application of a conversion equation.

For somatic cells analysis:

· An incubation reagent consisting of a clarification buffer, and a fluorescent marker is added to the milk in order to permeabilize the somatic cells and stain their DNA.

· The fluorescent marker intercalates rapidly and selectively into all the somatic cells double-stranded nucleic acid.

· After the incubation period, a portion of the incubation mixture is transferred to the flow cytometer where the somatic cells are aligned and exposed to an intense laser beam and fluoresce.

· The fluorescent signal is collected by the optics, filtered, and detected with a photomultiplier.

· The intensity and height of the fluorescent pulses are recorded and used as gating parameters.
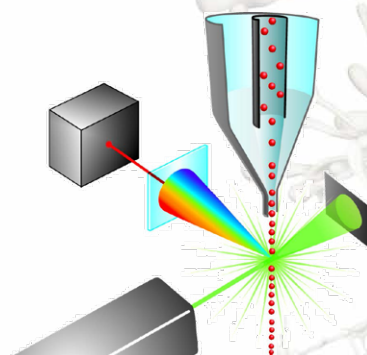
## BactoCount IBC$_M$ 3.0 - Nexgen multiplex flow cytometry

The new BactoCount IBC$_M$ 3.0 offers multiplex applications thanks to its unique dedicated plateform. Up to two applications can be run simultaneously on a given sample. The overall design of the instrument has also been designed to allow ease of access and maintenance. With this in mind, IBC$_M$ 3.0 embeds a new kinetic, self aligned flow cell mounting system.

BactoCount Global Standardization

SRM Microspheres Working Solution

Our Secondary Reference Material (SRM) of microspheres working solution is use to control the flow cell alignment, good mechanical performance and optimal standardization of the flow cytometer.
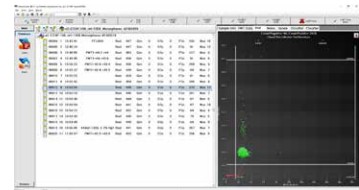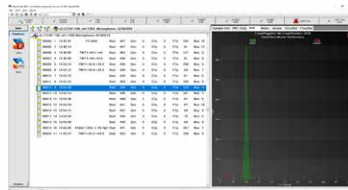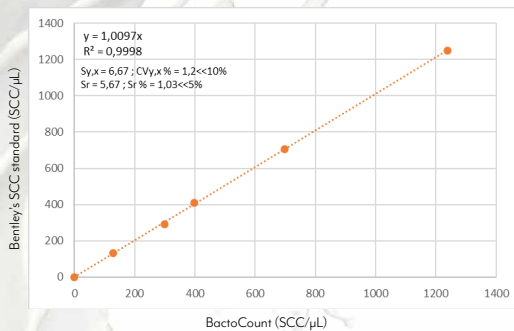

SRM Bacteria (IBC)

Consisting of bacteria present in raw milk, our long shelf-life SRM can be quickly reconstituted to control the chemistry, sonication treatment and optimal standardization of the instrument.
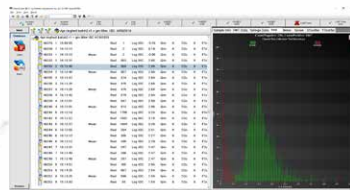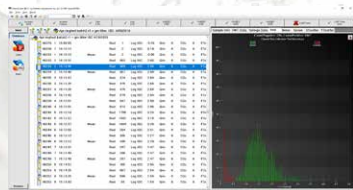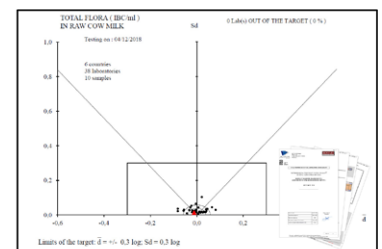

SRM Somatic Cells (SCC)

Made up of 5 long shelf-life SRM, our calibration range can be quickly reconstituted to control the chemistry and optimal standardization of the instrument.

$y = 1,0097x$
$R^2 = 0,9998$
$S_{y,x} = 6,67$; $CV_{y,x}\% = 1,2 << 10\%$
$S_r = 5,67$; $S_r\% = 1,03 << 5\%$

Bentley's SCC standard (SCC/µL) vs BactoCount (SCC/µL)

Proficiency Testing Total Bacteria ISO 17043 (IBC)

Our international monthly Total Bacteria (IBC) ISO 17043 certified Proficiency Testing (PT), organized in collaboration with Actalia-Cecalait (French reference laboratory), is the optimal way to control the BactoCount standardization and to guarantee IBC and CFU results global equivalence after application of our universal conversion equation.

BactoCount IBCm 3.0 - ID card*

Raw milk type	Cow, goat, sheep, buffalo, ...	
Carry-over	≤ 1% (typically ≤ 0.5%)	
Total Bacteria	At least equivalent to BactoCount IBCm & ISO 4833 standard	
	2 - 10,000 kIBC/mL	
Repeatability &	Range (kIBC/mL)	Specifications
Reproducibility	10 - 50	$Sr \leq 0,07$ log $\quad S_R \leq 0.14$ log
	51 - 100	$Sr \leq 0,06$ log $\quad S_R \leq 0.12$ log
	101 - 300	$Sr \leq 0,05$ log $\quad S_R \leq 0.10$ log
	> 300	$Sr \leq 0,03$ log $\quad S_R \leq 0.06$ log
Accuracy	$Sy, x \leq 0.3$ log (ISO 4833)	
Somatic cells	0 - 10,000 thousand cells (kSCC)/mL	
Accuracy	≤ 10% (ISO 13366-1)	
Repeatability	Range (kSCC/mL)	Specifications
	100 - 300	$Cv \leq 5\%$
	300 - 500	$Cv \leq 3\%$
	> 500	$Cv \leq 2\%$

Technical specifications

Undiluted Work Factor	100 - 200
Speed	Up to 50 analysis/hour
Power supply	115/220 V ; 50/60 Hz
Dimensions (WxHxD)	68.6 x 43.2 x 55.9 cm
Weight	50.4 kg

**Connected to the local database and remotely accessible**

* Specifications subject to change without any prior notice.

World Class Service & Support

Delivering a rapid and superior level of customer support is a top priority at Bentley Instruments.

Our experienced team provides on site installation, training and service as well as phone and internet support to help you maintain the highest level of productivity.

BENTLEY INSTRUMENTS
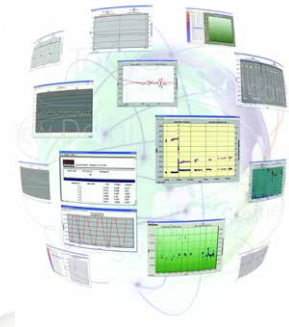
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