

Next Generation of Milk Analysis

NexGen Series
FTS Combi

Fat, Protein, Lactose, Solids, Somatic Cells +





WELCOME TO THE NEXGEN SERIES

Bentley Instruments' NexGen represents the culmination of more than 20 years of listening and responding to our customers.



The Bentley NexGen represents the latest in state-of-the-art technology for automated milk analysis at 500 samples/hour. Engineered in accordance with Bentley Instruments' rigorous design principles, the NexGen provides precise and accurate measurements. The Bentley NexGen comprises two separate modules—the Bentley Flow Cytometer (FCM), and the Bentley Fourier Transform Spectrometer (FTS). The FCM measures the somatic cell count of the milk samples while the FTS simultaneously measures the milk composition, including fat, protein and lactose. After first being stirred, the milk is withdrawn from a sample vial and delivered to both measurement modules. The sampling, sequencing and identification of the sample vials are functions performed by the Autosampler.

Technology Executive Summary

The Bentley FTS component analyzer uses an industrial Fourier Transform Spectrometer (or FTIR) that captures the complete infrared absorption spectrum of the milk sample for component analysis. Collecting the complete spectrum allows the calibration to be based on all spectral characteristics of each particular component. The infrared spectrum is permanently stored so that at any time in the future other calibrations may be retroactively applied to your data.

The Somacount FCM is the next innovation in the evolution of our world-renowned instruments for somatic cell counting. Based on a highly stable solid-state laser induced fluorescence, this module is capable of delivering an accurate and timely warning for mastitis onset.

The Standard of Bentley Instruments

For over 20 years, Bentley Instruments has been a leader in the development of highly accurate, robust milk analysis equipment. As the only company in the world focused 100% on this type of instrumentation, we understand the challenges of this industry and need for constant innovation.

Founded in 1985, Bentley Instruments has earned a reputation for developing reliable dairy analysis equipment that is both highly reliable and accurate. We provide the highest level of service, from web-enabled instrument monitoring and diagnostics analysis to onsite and telephone support. We understand the workflow demands of a modern dairy processing facility and do whatever it takes to keep your operation moving, no matter where in the world your laboratory is located.



Engineered for dairy laboratories and dairy processing facilities that require a highly reliable and accurate instrument with high throughput.

BENTLEY NEXGEN DESCRIPTION

The NexGen incorporates the latest technology for automated milk component and somatic cell testing.

With the Bentley NexGen, control of both the FCM and FTS modules is integrated into a single Windows-based software program. The simple and intuitive graphical user interface is designed for easy operator use. The software's sophisticated data export and reporting functions and network access capability allow lab supervisors to monitor instrument status and analyze results remotely.

Extensive diagnostics are collected on the NexGen so the user can be assured that the instrument was performing optimally when the sample data was taken. And because a full set of diagnostic readings is stored with each sample run, an audit trail exists to validate the state of the instrument during data collection. Prior to sampling, the sample temperature is read and recorded while the sample is being stirred. An external temperature probe is also provided for the user to deploy in their water bath. That temperature is logged for each sample run as well. Other examples of the diagnostics include a variety of critical temperatures, optical system alignment, laser power, the pump's characteristic pressure curve, humidity level and air pressure within the FTS optical deck, and the presence of shock or vibration on the instrument. Should a problem develop with the instrument, immediate assistance from Bentley Instruments' service personnel can be greatly facilitated by reviewing these instrument diagnostics. Bentley Instruments' service staff can also log onto the instrument remotely to further aid in troubleshooting.



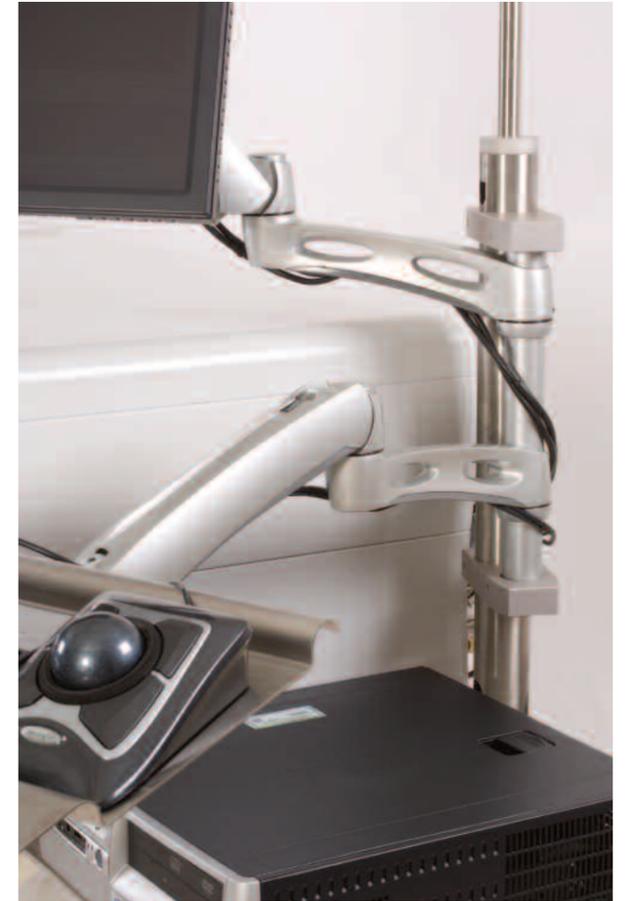
A wide variety of data output options are available, including diskette, serial, parallel and through network connections, which can be easily configured to be compatible with existing systems.

The NexGen exceeds the IDF 148A standard and ICAR requirements for somatic cell counting and IDF 141C:2000 and ICAR requirements for component measurement employing AOAC approved methodology.

Applications

Primary applications include the measurement of fat, protein, lactose, solids, other components and somatic cells.

The system is engineered for dairy laboratories that require a highly reliable and accurate instrument for performing up to 500 individual tests per hour. The mid-infrared Bentley FTS is designed with speed and throughput in mind, and the interferometer is a hardened industrial module that still retains its roots in a research grade spectrometer. The NexGen system has been developed "future-proof" for organizations needing an instrument that can measure additional metrics to meet the more detailed milk analysis requirements demanded by consumers and government regulators.



The NexGen helps companies meet the milk analysis requirement demands of consumers and government regulators.

NEXGEN FEATURES

The bottom line for the NexGen's feature set: this is an easier-to-use, more reliable instrument.

- Ergonomic display monitor and keyboard are easily adjustable to individual operators.
- Powerful Windows-based software integrates simultaneous control, data collection, analysis, archiving, and report generation for both the FTS and Somacount instruments.

- Interferometer is laser-referenced and contained within a hermetically-sealed and temperature-regulated optical deck.

- Internal heated reservoir provides for auto-rinse and auto-zero functions.

- Completely independent dual-channel cytometer provides for high-throughput and operational redundancy.

- High-powered, long-lifetime, solid-state semiconductor laser facilitates fluorescence excitation.

- Laser-drilled pipette filters sample at inlet.

- Sample temperature is recorded during the pre-stirring operation.

- Autosampler sequences, pre-stirs and delivers fluid to both instruments at 500 samples/hour using noncontact optical sensors to control rack position and movement.

- Sample identification is automatically recorded by barcode or RFID reader.

- All standard rack configurations and vial sizes are supported.

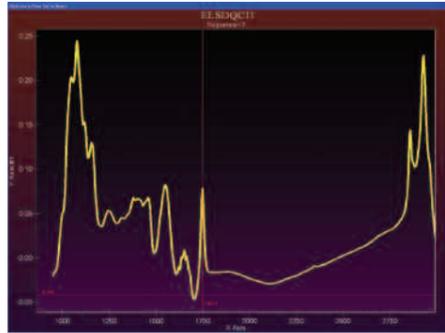
- Front panel LEDs provide immediate visual feedback for operators on overall instrument status and operation.



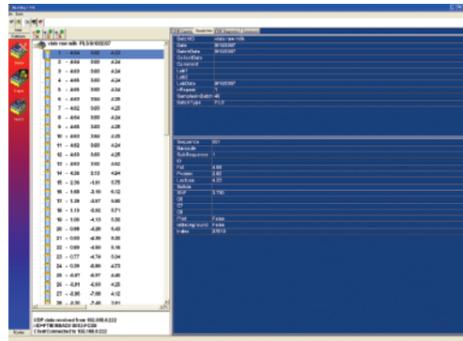
Two separate modules—the FCM and FTS—work together to provide the most precise and accurate measurements for milk analysis.

REAL TIME MILK QUALITY ANALYSIS AND REPORTING

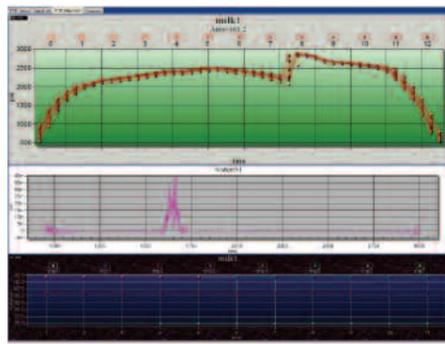
The NexGen presents results and diagnostic information in a clear, concise manner. Customized analysis reports can be generated for routine output.



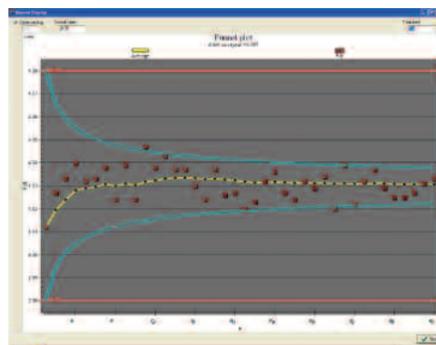
The raw data for milk component measurement is the complete FTIR absorbance spectrum as shown here. Sophisticated multivariate calibration algorithms are used to extract the compositional information. The spectrum is permanently archived for future reference, and the user can export the spectra for further analysis.



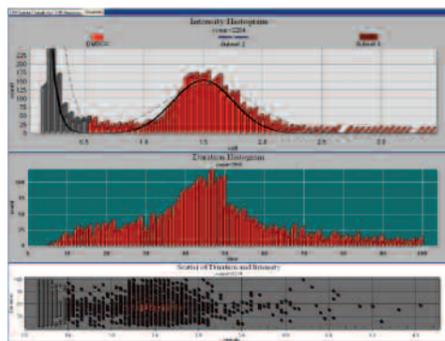
This report shows a summary of the details of a particular sample, including the batch and sample identifiers, and the measured component values.



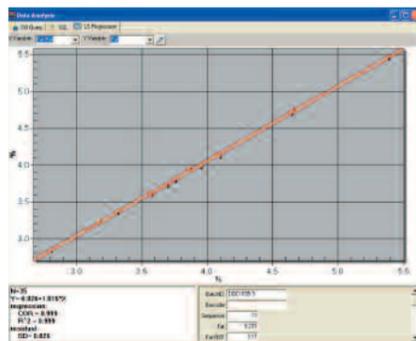
Real time diagnostic information is provided for each sample. Here the infrared spectrum and the pump pressure characteristic plots are shown. Tab selection at the top of the screen allows the operator to easily switch between various views.



Component repeatability and stability are easily verified using the IDF funnel plot.



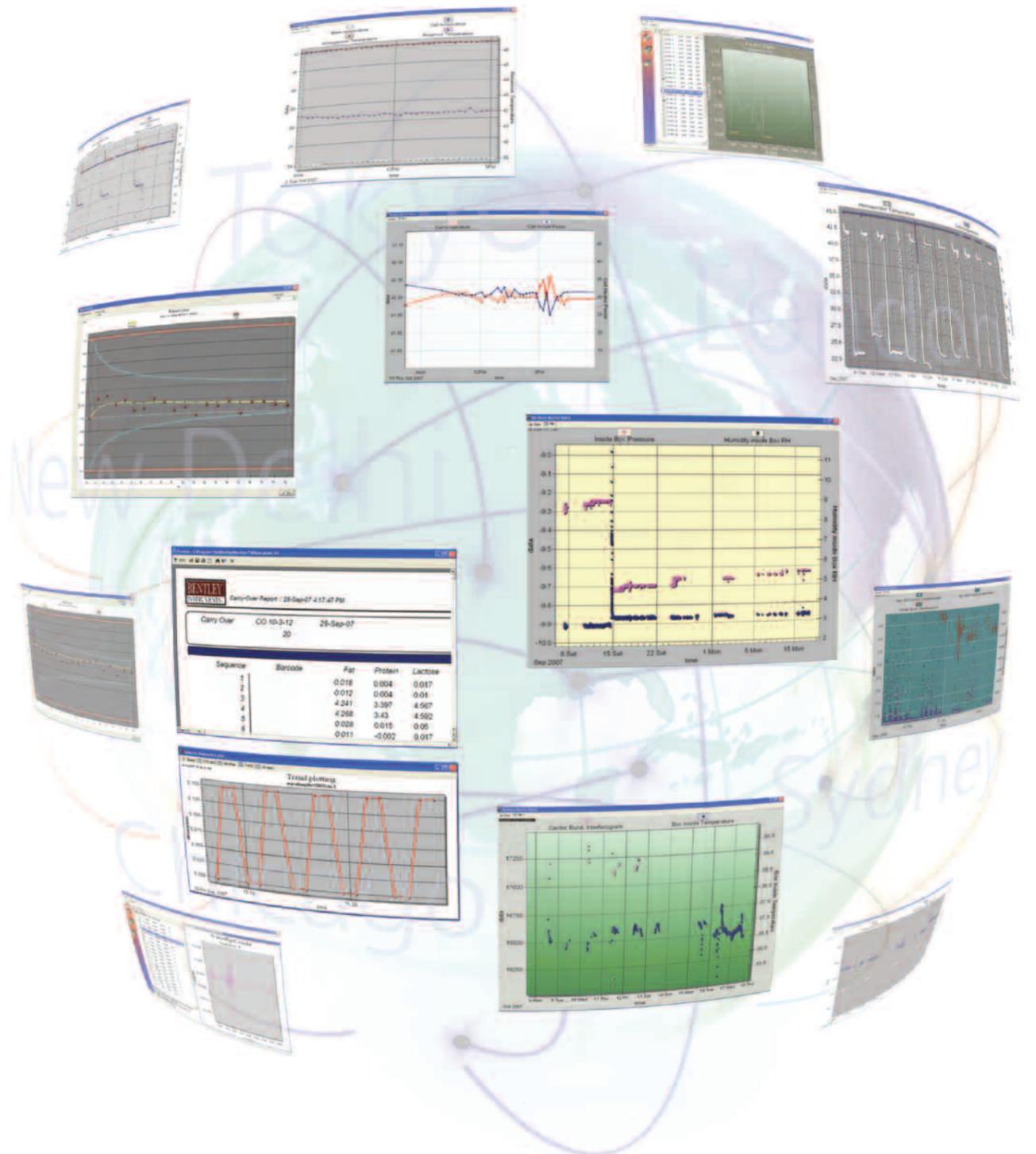
The pulse height and width histograms for the Somatic FTS shown here are used to derive the somatic cell count.



Accuracy is verified using this plot showing a regression analysis of the measured vs. the reference values for a set of calibration samples.

REMOTE DIAGNOSTIC CAPABILITIES

The web-enabled diagnostic features of the NexGen series allow Bentley Instruments to access your machine from any location. This enables your laboratory personnel and Bentley Instruments to collaborate and analyze all system functionality, no matter where the instrument is located.



SOMACOUNT™ FCM MODULE

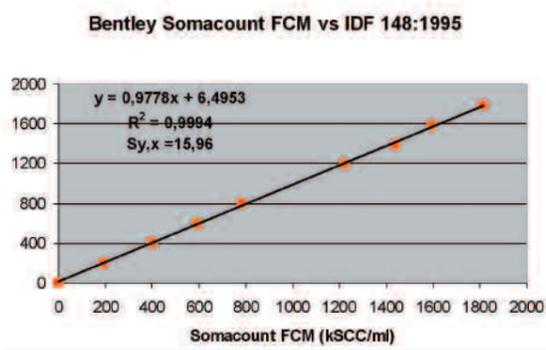
The Somacount FCM is based on proven fluorescence cytometry methodology for somatic cell counting.

The Somacount FCM uses a proprietary process based on the principle of laser-based flow cytometry to determine the somatic cell count in raw milk. Flow cytometry is an extremely powerful and versatile technique and is the method of choice in the medical field for detecting, analyzing and sorting cells. The Somacount FCM is the result of 15 years of experience and research in flow cytometry; the first instrument was developed in 1991.

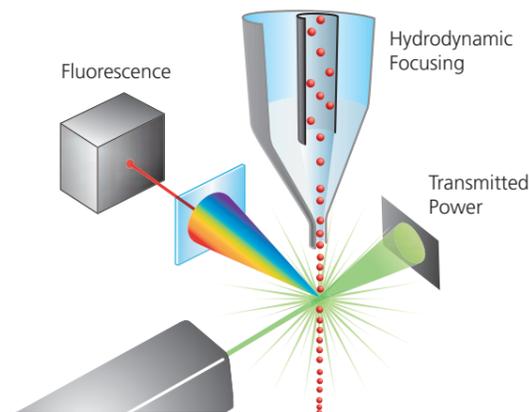
The milk sample is first treated with a proprietary buffer solution that stains the milk somatic cells with a fluorescent dye. This solution is then injected into the flow cytometer where hydrodynamic focusing ensures that the stained somatic cells intersect an intense laser beam, which causes the cells to emit fluorescent light. This fluorescent light is then collected and detected. Post-analysis of histograms that show the heights and widths of the electronic pulses results in the total somatic cell count. The histograms are recorded and archived so they may be recalled in the future in the event that further data analysis methods become available.

The FCM consists of two identical flow and optical channels. This dual-channel construction provides redundancy. Should a problem arise in one channel, the operator can simply shut down that side and continue to test samples at a reduced speed of up to 300 samples/hour. A more powerful and reliable diode-pumped solid-state laser replaces the gas laser of previous generations. Laser power is monitored and recorded for stability.

The FCM exceeds the IDF 148A Standard and ICAR requirements for Somatic Cell Counting and uses AOAC approved methodology.



Example showing the accuracy of the Somacount FCM.



Somacount FCM Technical Specifications	
Measuring Speed	500 samples per hour
Sample Volume	< 5ml
Sample Temperature	38-42°C
Start Up and Shut Down	Less than 10 minutes
Measurement Range	0-10,000,000 cells/ml
Milk Type	Cow, goat, sheep, buffalo raw milk
Accuracy* (Cv)	≤ 10% (against direct microscopic count)
Repeatability* (Cv)	SCC ≤ 500,000 ≤ 4% SCC ≤ 300,000 ≤ 5% SCC ≤ 100,000 ≤ 7%
Carry-Over	< 1%
Work Factor	150
Sample Condition	Fresh or preserved
Electrical	110/220V; 50/60Hz
Dimensions (LxWxH)	23.5" x 32.75" x 15" (59.7cm x 83.2cm x 38.1cm)
Weight	200 lb (91 kg)

*Specifications subject to change without any prior notice.

BENTLEY FTS MODULE

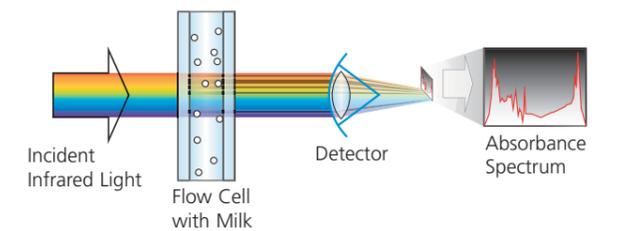
"Future-proof" Bentley FTS offers complete milk analysis today with the capability to incorporate novel component calibrations tomorrow.

At the heart of the Bentley FTS is a Fourier Transform Spectrometer (or FTIR) that captures the complete infrared absorption spectrum of the milk sample for component analysis. Collecting the complete spectrum allows the calibration to be based on multiple spectral characteristics of each particular component. The optical deck of the FTS is housed in a hermetically sealed enclosure, ensuring enhanced temperature stability and environmental robustness. The air in the sealed deck is pumped out, leaving the deck under vacuum. The combination of the hermetic seal and removing the humid air greatly reduces the humidity load on the enclosed desiccant, virtually eliminating the preventative maintenance task of frequent desiccant regeneration.

This complete infrared spectrum is permanently stored so that at any time in the future, other calibrations could be retroactively applied to your data. The user is provided full access to the complete spectrum; it can be viewed in the software or the data points can be exported for use with external programs. With this access to the spectrum, the user can easily accommodate measurements of new components as they become important in the future. Novel calibration development can be undertaken independently by the user or in conjunction with Bentley Instruments.

The FTS has a temperature-regulated fluid reservoir for the dual purposes of providing for regular and automatic zero (or background) scans for the instrument, as well as automatically rinsing the cell and plumbing lines after running milk samples.

The FTS exceeds the IDF 141C:2000 Standard and ICAR requirements for Milk Component Measurement and uses AOAC approved methodology.



A filter-based analyzer only collects data in the light blue band indicated here. The FTS collects the complete infrared spectrum for component analysis.

Bentley FTS Technical Specifications	
Measuring Speed	500 samples per hour
Sample Volume	6 ml
Sample Temperature	38-42°C
Start Up and Shut Down	Less than 10 minutes
Measurement Range (Fat, Protein, Lactose, Solids)	0-15%
Milk Type	Cow, goat, sheep, buffalo raw milk
Accuracy* (Cv)	Cv < 1% for all components
Repeatability* (Cv)	Cv < 0.5% for all components
Carry-Over	< 1.0%
Sample Condition	Fresh or preserved
Electrical	110/220V; 50/60Hz
Dimensions (LxWxH)	23.5" x 32.75" x 15" (59.7cm x 83.2cm x 38.1cm)
Weight	200 lb (91 kg)

*Specifications subject to change without any prior notice.



Bentley Instruments, Inc.
4004 Peavey Road
Chaska, Minnesota 55318 USA
Tel: 952-448-7600 Fax: 952-368-3355
E-mail: Sales@BentleyInstruments.com

www.Bentleyinstruments.com

Somacount is a registered trademark of Bentley Instruments, Inc.,
all rights reserved. Specifications subject to change without notice.