FOSS

CombiFoss™ 7

Herd-improvement and payment testing in one integrated unit

The CombiFoss™ 7 seamlessly integrates MilkoScan™ 7 RM and Fossomatic™ 7 or Fossomatic™ 7 DC to test raw milk for up to 19 parameters including the new differential somatic cell count for more effective mastitis management. Results are delivered simultaneously in six seconds while unique hardware and software features boost proficiency in the laboratory.

Sample	Parameters
Raw cow, sheep, goat and buffalo milk	Somatic cell count, *Differential somatic cell count, fat, protein, lactose, solids, urea, Freezing Point Depression, Free Fatty Acids, casein, fatty acids profile, ketosis and others such as pH, H-index and untargeted adulteration screening **Cow's milk*

19 parameters from a single sample in six seconds

Take the lead in raw milk testing and stay there. The CombiFoss™ 7 provides unique test options such as new differential somatic cell count allowing you to give farmers more sophisticated data for improved mastitis management. It is the first high-throughput analyser for simultaneous differential somatic cell count and total somatic cell count. Other advanced tests pioneered by FOSS include Ketosis screening and untargeted raw milk (adulteration) screening to help your customers meet modern challenges such as dairy herd productivity, feeding efficiency and protection of the milk supply.

An integrated unit avoids the time and cost of separate equipment with one rapid analysis of up to 19 parameters in six seconds.

More results at less cost with 7th generation CombiFoss technology

Under the lid of the CombiFoss 7, hardware and software features boost proficiency in the laboratory and keep the results flowing in step with the capacity demands of any laboratory. The latest in flow system technology including a diamond cuvette technology ensures maximum uptime. The cuvette element is backed by a 10 year guarantee and you can trust in the reliability of results, whether running at 100 or 600 samples per hour.

The new modular sample conveyor avoids use of compressed air and makes cleaning quick and easy.

Higher proficiency and less man hours

Besides a smart hardware system, the latest in networking software allows effective control of multiple instruments. Control from a single desktop saves time and ensures identical performance across CombiFoss units regardless of location. Other advantages include:

- Reduced risk of data loss because data is always backed up in one place
- Minimal downtime because upgrades and adjustments are made while instruments continue to run
- More consistent operations because instrument management tasks are performed in one go, reducing the risk of human error

The 7th generation CombiFoss

Samples: Raw milk from cow, sheep, goat and buffalo.
Parameters: Fat, Protein (true & crude), Casein, Lactose, Solids (SnF & TS), Urea, Citric Acid, Free Fatty Acids, Fatty Acids Profile, Freezing Point Depression, pH, Ketosis Screening (BHB & Acetone), Untargeted Raw Milk (adulteration) screening

MilkoScan™ 7 RM

The MilkoScan™ 7 RM is a high capacity (up to 600 samples per hour), fully automatic raw milk analyser for central milk testing (CMT) payment and dairy herd improvement (DHI). Employing Fourier Transform InfraRed (FTIR), it measures a full range of compositional testing parameters. It is ISO/IDF and AOAC compliant. Homogeniser efficiency and sample intake temperature is automatically monitored to secure optimal performance. FOSS proven standardisation ensures alignment between instruments.

7th generation advantages include:

- Modular design for ease of cleaning and maintenance
- Easy to clean sample conveyor without need for compressed air
- The latest in flow system technology including a diamond cuvette technology ensures maximum uptime. The cuvette element is backed by 10 year guarantee.
- New Foss Integrator NOVA software
- Improved repeatibility for minor constituents

Fossomatic™ 7

Two models are available: Fossomatic™ 7 for accurate somatic cell counting and Fossomatic™ 7 DC model for somatic cell counting with differential somatic cell counting capability. Both models handle up to 600 samples per hour and are based on flow cytometry technology that counts somatic cells in compliance with ISO/IDF and FDA/NCIMS standards.

7th generation technology includes

- Modular design for ease of cleaning and maintenance
- Improved working factor from 300 to 100 (Fossomatic 7)
- Option to choose manual or automatic reagent mixing
- Rinse liquid refill without instrument stop
- Easy to clean sample conveyor without need for compressed air
- New Foss Integrator NOVA software

Samples:
Fossomatic 7: Raw cow, sheep, goat and buffalo milk for the total somatic cell count.
Fossomatic 7 DC: Raw cow milk for differential somatic cell count.

and raw cow milk for differential somatic cell count

Technology

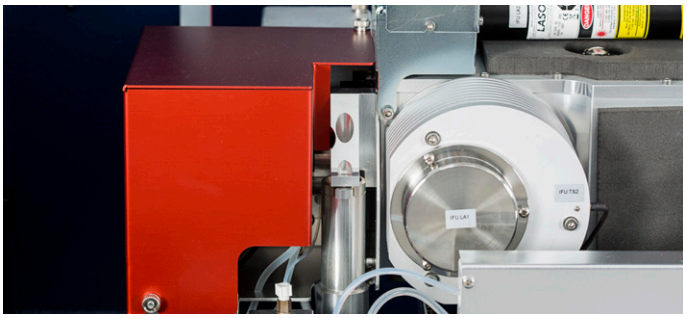
MilkoScan™ 7 RM

MilkoScan™ 7 RM is based on Fourier Transform InfraRed (FTIR) analysis. It works with the mid-Infrared region of the spectrum from 3 - 10 µm corresponding to 1000 – 5000 cm -1.

The latest in flow technology optics allows an excellent signal to noise ratio with a highly robust diamond cuvette. The result is stable high performance and very high repeatability, even for low concentration constituents. The FTIR interferometer scans the full infrared spectrum, collecting data simultaneously and allowing measurement of multiple parameters. Analysis of an additional parameter simply becomes a matter of calibration.

Standardisation

The fact that FTIR instruments are standardised offers a great advantage. A calibration developed on one instrument may be transferred to other instruments, which due to the standardisation will provide identical readings. Standardisation is achieved by comparing spectra of a specially developed FTIR equalizer sample, collected on a newly installed instrument (slave) to the spectra of a similar sample using a master instrument at FOSS.



MilkoScan™ 7 RM has a diamond cuvette backed by 10 years guarantee. Optics are optimized on the interferometer module increasing the signal/ noise ratio, ensuring the same high performance at all cadences and improving repeatability for minor constituents.

Fossomatic™ 7

Fossomatic 7 is available in two models: Fossomatic 7 for SCC only and Fossomatic 7 DC for SCC & DSCC. Both models count somatic cells based on recognition of DNA from the cells.

A mixture of milk and staining solution is surrounded by a sheath liquid and passed through a flow cell. In the flow cell, the stained somatic cells are exposed to light of a specific wavelength. The cells then emit fluorescent light pulses at a different wavelength and the pulses are counted and displayed. The design of the flow cell ensures that only one somatic cell is detected at a time.

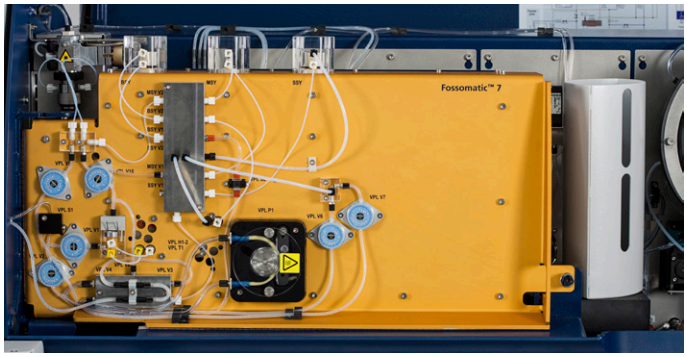
Fossomatic 7 is based on the widely-recognized Fossomatic FC technology, but with new design features for easier maintenance and cleaning and reduced costs of operation. The same reagents are used as with earlier models.

Fossomatic™ 7 DC

Differential Somatic Cell Count (DSCC) is a new milk testing parameter introduced with the CombiFoss 7 DC analyser. It complements the established test for total number of somatic cells (SCC) pioneered by FOSS in the 1980's.

The Fossomatic 7 DC has several sensors detecting fluorescence signals from milk cells and a new chemistry and an incubation unit. Combined, they enable the instrument to measure DSCC and SCC simultaneously.

Cell differentiation refers to the differentiation of immune cells occurring in milk into lymphocytes, macrophages, and polymorphonuclear neutrophils (PMN). These three cell populations play a vital role in inflammatory responses within the mammary gland. In summary, lymphocytes regulate the induction and suppression of immune responses. PMN cells defend against invading bacteria at the beginning of mastitis. Macrophages recognize invading mastitis pathogens and initiate the immune response by starting a massive influx of PMN. Beyond that,



Fossomatic™ 7 and Fossomatic™ 7 DC has the new measuring module powered by a laser. Fossomatic 7 DC has several sensors detecting fluorescence signals from milk cells, a new chemistry and an incubation unit. All of them combined enable the instrument to measure DSCC and SCC simultaneously.

macrophages ingest bacteria, cellular debris, and accumulated milk components and carry out tissue repair. While milk from healthy mammary glands contains mainly macrophages and lymphocytes, PMN are the predominant milk cell population in the presence of infection.

The FOSS approach

For practical purposes the three populations are measured as two population groups: one for Macrophages and another combining PMN and lymphocytes. The DSCC represents the combined proportion of the PMN and lymphocytes in percent. The percentage of Macrophages is 100 – DSCC.

The new DSCC parameter in combination with the total SCC provides a more detailed picture of the actual inflammatory status of the mammary gland. In turn, this opens up the possibility to develop new tools which can help farmers improve mastitis management.

Foss Integrator software

CombiFoss™ 7 is supported by a dedicated Foss Integrator™ software with an easy-to-use FOSS NOVA interface. Foss Integrator provides a wide range of quality assurance and GLP features. Foss Integrator shares the same interface for all CMT instruments.

Mosaic networking software for raw milk testing instruments

Mosiac networking software allows multiple instruments to be monitored and controlled from a single desktop, reducing the cost of ownership of multiple installations and making day to day maintenance tasks such as calibration updates quicker and considerably more convenient. If required, the software can also allow FOSS experts to access data for remote support via the internet.

Sample handling and maintenance

The sample ID system supplied with the CombiFoss 7 is designed to make the job of controlling samples and sample data as simple as possible. It supports both barcode and RFID sample identification concepts. A modular design ensures ease of cleaning and maintenance including a sample conveyor that does not require use of compressed air. An intelligent pipette system improves safety by detecting closed lids on samples bottles.

Up to 600 samples per hour handled with minimal cleaning and maintenance work

Specifications Fossomatic™ 7 and Fossomatic™ 7 DC

Performance	
Measuring range	0 – 10 mill cells/ml
Performance range	0.1 – 1.5 mill
Repeatability*	CV < 6% 100-299k SCC/ml CV < 4% 300-499k SCC/ml CV < 3% 500-1500k SCC/ml
Accuracy	< 10% relative mean diff. from DMSCC (Direct Microscopic Somatic Cell Count)
Carry-over	< 1% relative usually below 0.4%
Sample types	Fossomatic™ 7: Cow's, goat, sheep and buffalo milk Fossomatic™ 7 DC: Cow's milk

**CV = Coefficient of variation (STDev/AVG) x 100. (STDev = Standard deviation. AVG = Average)*

Application data

Analysis Capacity	100, 200, 300, 400, 500 or 600 samples per hour
Sample intake	2.5 ml (programmable 2.0 – 5.0 ml)
Required sample temperature	30 - 42 °C (86-107.6 F)
Working factor	100 or better*

**Fossomatic 7 DC 300 or better*

Standards and approvals

Fossomatic™ 7 is CE-labelled and complies with the following directives and regulations:

- EMC (ElectroMagnetic Compatibility) Directive 2004/108/EC
- LVD (Low Voltage) Directive 2006/95/EC
- Machinery Safety Directive 2006/42/EC
- Regulation (EC) 1272/2008 on classification, labelling and packaging of substances and mixture, CLP (EC)
- WEEE Directive 2002/96/EC
- Packaging and packaging waste Directive 94/62/EC
- REACH 1907/2006/EC

Fossomatic technology complies with:

- AOAC
- ISO 13366-2 / IDF 148-2:2006
- Laser approval (FDA), IEC 60825-1
- EURL/Microval (validation pending)
- FDA NCIMS

Specifications MilkoScan™ 7 RM

Most of the calibrations are using multiple wavelengths selected freely from the entire Mid-IR spectrum in order to optimize robustness and accuracy. Compared to traditional filter calibrations, they are called full spectrum calibrations.

Performance

Carry-over for all components <1% relative

Component	Measuring range	Performance range	Repeatability	Accuracy Bulk	Accuracy Single cow
Fat	0-15%	2-15%	Cv < 0.5%	Cv < 1.0%	Cv < 1.5%
Protein	0-10%	2-10%	Cv < 0.5%	Cv < 0.9%	Cv < 1.5%
Lactose	0-10%	2-10%	Cv < 0.5%	Cv < 0.9%	Cv < 1.5%
Solids	0-20%	2-20%	Cv < 0.5%	Cv < 1.0%	Cv < 1.5%
Urea Patented	10-100mg/dl	10-100mg/dl	Sd < 1.5mg/dl	Sd < 3mg/dl	Sd < 3.5mg/dl
Citric Acid	0.1-0.5%	0.1-0.5%	Sd< 0.005%	Sd < 0.01%	Sd < 0.015%
FPD(Screening)	400-600 m°C	450-550 m°C	Sd < 0.5 m°C	Sd < 4 m°C	N/A

Novel parameters

Fatty acids profile	see the application note no. 64.
Ketosis screening (BHB, acetone)	see the application note no. 35
Untargetted screening raw milk (adulteration)	see the application note no. 5375

Application data

Analysis Capacity:	100, 200, 300, 400, 500 or 600 samples per hour
Sample intake:	5 mL
Required sample temperature:	37 - 42°C
Performance Specifications:	Full spectrum calibrations

Standards and Approvals

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- EMC (ElectroMagnetic Compatibility) Directive 2004/108/EC
- LVD (Low Voltage) Directive 2006/95/EC
- Machinery Safety Directive 2006/42/EC
- Regulation (EC) 1272/2008 on classification, labelling and packaging of substances and mixture, CLP (EC)
- WEEE Directive 2002/96/EC
- Packaging and packaging waste Directive 94/62/EC
- REACH 1907/2006/EC

The MilkoScan™ 7 RM techniques comply with:

- ISO 9622 / IDF 141:2013
- AOAC official method 972.16

By using wavelengths from the entire Mid- IR spectrum for each component, calibrations are optimised in terms of robustness and/or accuracy (temperature, homogenization and humidity)

OFFER BETTER SERVICE WITH 19 PARAMETERS FROM A SINGLE SAMPLE IN SIX SECONDS, INCLUDING NEW DIFFERENTIAL CELL COUNT (DSCC)

- Give farmers better data for mastitis management with the first high-throughput analyser for simultaneous differential somatic cell count and total somatic cell count
- Avoid time and cost of separate equipment with one rapid analysis of up to 19 parameters in six seconds
- Build new business by offering advanced tests such as ketosis screening, free fatty acid profiling and untargeted adulteration screening

MORE RESULTS AT LESS COST WITH 7TH GENERATION COMBIFOSS TECHNOLOGY

- Achieve high uptime with new flow system technology including a diamond cuvette (backed by 10 year guarantee)
- Trust in reliability of results, whether running at 100 or 600 samples per hour
- Make cleaning easier and quicker with new modular sample conveyor

HIGHER PROFICIENCY AND LESS MAN HOURS WITH THE LATEST IN INSTRUMENT MANAGEMENT SOFTWARE

- Save your feet and save time by controlling multiple instruments from your desktop
- Avoid downtime by making upgrades and adjustments while instruments continue to run
- Perform operations in one go to reduce risk of human error and keep all data backed up in one place

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