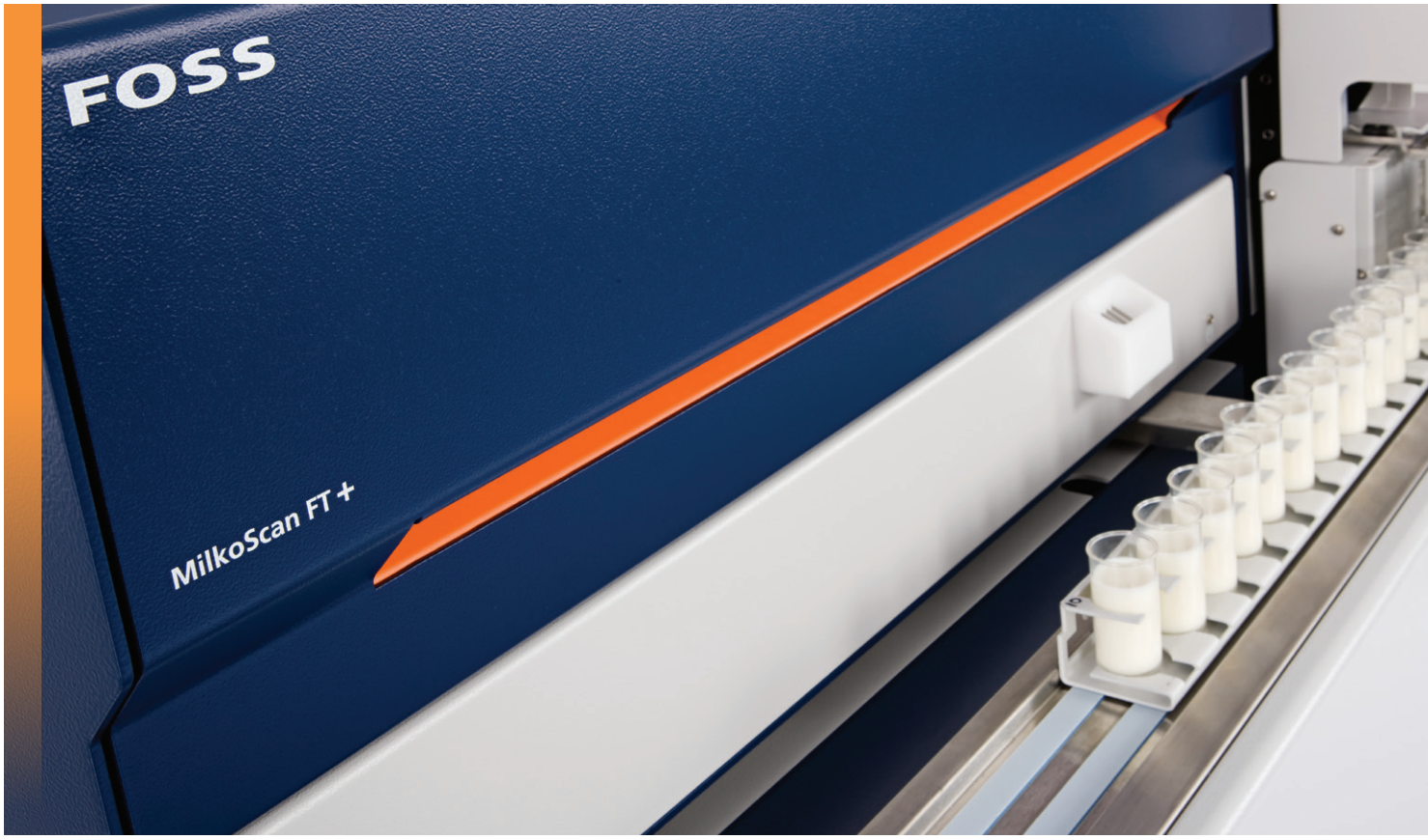
FOSS

MilkoScan™ FT+
for routine compositional raw milk analysis



The MilkoScan™ FT+ is a high capacity (up to 600 samples per hour), fully automatic 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. Now also for rapid screening of ketotic cows. FOSS patented standardisation ensures alignment between instruments.

MilkoScan FT+ can be integrated with the Fossomatic™ FC somatic cell counter to form a CombiFoss™ FT+. Supported by a dedicated Foss Integrator™ software, which provides a wide range of quality assurance and GLP features. Foss Integrator shares the same interface for all CMT instruments.

Sample	Parameters
Raw milk from cow, sheep, goat and buffalo	Fat, Protein (true & crude), Casein, Lactose, Solids (SnF & TS), Urea, Citric Acid, Free Fatty Acids, Fatty Acids Profile, Freezing Point Depression, pH, Ketosis Screening, Adulteration screening (untargeted screening model)

Dedicated Analytical Solutions

Low cost of ownership

Based on excellent chemometric work and years of collecting data from all over the world, including seasonal and instrumental variations we have been able to create very robust calibrations. With calibrations that are ready to use, only needing minor adjustments on a monthly basis, you achieve a decrease in cost per sample.

The MilkoScan FT+ employs a patented standardisation principle that enables transfer of calibrations between instruments and significantly reduces the need and cost of calibration work.

Versatile operations

The MilkoScan FT+ is a versatile solution with a variety of benefits and options enableing you to help farmers stay ahead in the management of dairy herds as well as milk composition.

The enhanced flow system and the self-cleaning pipette make the system robust and reliable, which enables analyses of difficult milk samples and milk from sheep and goats.

The ability to profile milk according to levels of healthy fats is one new opportunity provided by saturated and unsaturated fatty acid measurements, including polyunsaturated and monounsaturated fatty acids.

The groundbreaking Casein calibration is another important facility as is the calibration for free fatty acid analysis that is enhanced for the MilkoScan FT+.

Save your farmers from the cost of ketosis

Good dairy farmers have known for many years that ketosis can be a very costly disease, and many farmers have had a feeling that clinical cases were only the tip of the iceberg. In a Canadian study it was found that on average 30 % of early lactation cows in Canadian herds suffer from subclinical ketosis. Based on this paper and other publications, the losses due to subclinical ketosis have been estimated to be 273 euro per case under Canadian conditions. Losses are due to lower milk production, increased risk of culling or death. With this knowledge in mind it is obvious that the interest to include this parameter into routine services done on milk recording samples is constantly increasing!

Early warning for an entire herd

Ketosis is only visible in the clinical stage so if it can be caught in the early sub-clinical phase a lot of milk and animal discomfort can be avoided. It is also rarely limited to individual cows, therefore the real value is a baseline incidence rate for the entire herd which can go up and down according to changes in management of feed. The value is picking up any changes that are increasing the incidence. If you see the incidence go up from one test to another you can right away look at the management right after calving and make sure that it is optimized.

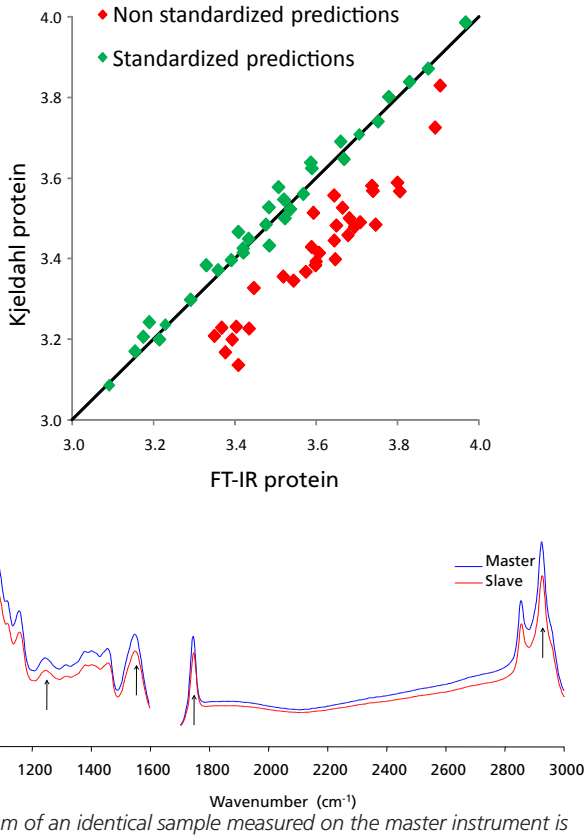
Technology

The MilkoScan FT+ is a high capacity, fully automated IDF and AOAC compliant FTIR (Fourier Transform InfraRed) spectrophotometer. The FTIR technology provides potential for analysis of virtually any component in milk.

Standardisation and equalizer patent

The MilkoScan FT+ employs a patented standardisation principle that makes it possible to transfer calibrations between instruments, reducing the need and cost of calibration work considerably.

The purpose of standardization is to match the host (slave) spectra to the master spectra. Small spectral differences between instruments are very common and it is normal to see change of the optical elements of the instrument over time e.g. the cuvette and the laser. Once the spectral pattern and the chemical composition of the standardization liquid is defined, any spectrometers of the same kind may be standardized any number of times. By standardization, it is possible to compensate for differences in light path length which slowly is changed over time due to wear and to adjust this when the cuvette eventually is replaced.



A spectrum of an identical sample measured on the master instrument is compared to the slave instrument.

Components measured

All the following parameters can be measured with high accuracy: Fat, Protein (Crude and True), Casein, Lactose, Solids-non-Fat, Total Solids, Urea, Free Fatty Acids, Freezing Point Depression, Citric Acid, pH, Homogeniser Efficiency, mono- and poly- unsaturated fatty acids, as well as total unsaturated and saturated fatty acids and sample temperature at intake.

The self cleaning pipette

The MilkoScan FT+ uses an extraordinary self cleaning technique to ensure high up-time and optimal performance. The pipette is equipped with a filter to prevent dirt and other impurities from getting into the flow system. An efficient wiper removes dirt and the milk film from the pipette after a sample intake. When a rinse is performed the wiper is flushed and the dirt or remaining milk fat will be removed from the flushing chamber. In addition there is an automatic backflush of the pipette. With the MilkoScan FT+ you can always be certain to analyse representative samples with negligible carryover, every minute, hour and day of operation.

Notable features

- Unique performance – up to 600 samples per hour subject to choice of model
- More business opportunities like profiling milk samples according to fatty acid content and enhanced performance on free fatty acids analysis
- Efficient flow system and self-cleaning pipette handle even the most difficult samples – trouble free
- Flexibility to analyse milk from buffalo, sheep, goats and of course cows
- Built-in sample temperature monitoring ensures data credibility on critical components
- Automatic traceability of results
- WinISI calibration toolbox
- RFID (Radio Frequency IDentification) reader for sample ID
- 2D reader
- Bar code reader

Conveyors

You have a choice of a few automation solutions for the FOSS analysers to fully match your needs. Two impressive, and highly appreciated by our customers, standard conveyor systems are available: Conveyor 4000 and Conveyor Basic. They are intelligent units with a built-in microprocessor, controlled by the analyser and providing at minimum:

- Rack advance and positioning of sample bottles under the stirrer and the pipette
- Sample identification for the "ladder" position of the bar codes*
- Automatic detection of check-samples

Conveyor 4000 is the advanced and most flexible solution with many additional useful functions like:

- Automatic rewind of racks with samples to be re-tested
- Sample identification for bar codes of all positions, as well as 2D and RF-tags*
- Unique bottle rotation mechanism, for fully automated sample identification*
- Sample temperature conservation
- Extensions for creating more space for the bottle racks*
- Sample buffering*

Semi-automatic option, ideal for milk-testing laboratories with a lower sample throughput, is also available. In this version, a plate is placed instead of the conveyor.

**optional*

MilkoScan™ FT+ in a CombiFoss™ configuration

CombiFoss™

The MilkoScan FT+ can be integrated with a Fossomatic™ FC somatic cell counter to form a CombiFoss™ FT+, using the same conveyor, pipette and PC as the standalone instruments. This offers you a lot of flexibility, e.g. you can start with just a MilkoScan FT+ and later add a Fossomatic FC to form a CombiFoss.

The MilkoScan™ FT+ gives the analysis performance you need to meet new demands for analysis efficiency, and it offers you exciting new business opportunities at the leading edge of milk analysis.

Specifications

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[1]	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

Calibrations Using IDF and AOAC approved Wavelengths

Component	Measuring range	Performance range	Repeatability	Accuracy* Bulk	Accuracy Single cow
Fat (A)	0-15%	2-15%	Cv < 0.5%	Cv < 1.0%	Cv < 2.0%
Fat (B)	0-15%	2-15%	Cv < 0.5%	Cv < 1.0%	Cv < 1.5%
Protein	0-10%	2-10%	Cv < 0.5%	Cv < 1.0%	Cv < 1.5%
Lactose	0-10%	2-10%	Cv < 0.5%	Cv < 1.0%	Cv < 1.5%
Solids	0-20%	2-20%	Cv < 0.5%	Cv < 1.0%	Cv < 1.5%

Typical results for some of the additional parameters using full spectrum calibrations

Component	Calibration range	Validation range	Details on performance can be found in application notes
Casein	2.17 - 3.45%	2.17 - 3.24%	AN 277
Free fatty acids (mmol/10kg)	0.072 - 10.04	0.49 - 6.63	AN 280

Reference method: Fat: Röse Gottlieb and Gerber method, Protein: Kjeldahl and Amino Balck method, Lactose: Enzymatic method (BM), Solids: Evaporation, Urea: Diff.Ph, Citric Acid: enzymatic method (BM), FPD: CryoScope, Casein: Kjeldahl, FFA: BDI, Fatty Acids : Gas Chromatography

Calibration method is PLS for all calibrations. Specifications covers preserved and unpreserved cow's milk samples. The specified performance relates to the recommended 5 mL sample intake and a capacity up to 600 samples per hour.

**Independent validation set.*

Component	Calibration range	Validation range	Application Note
Fatty Acids Package I includes:			AN 64
Saturated fatty acids*	0.87 - 5.08%	0.87 - 5.08%	
Mono unsaturated fatty acids*	0.31 - 2.84%	0.31 - 2.84%	
Poly unsaturated fatty acids*	0.03 - 0.36%	0.03 - 0.36%	
Unsaturated fatty acids*/**	0.35 - 5.39%	0.35 - 5.39%	
Trans fatty acids*	0.04 - 0.08%	0.04 - 0.08%	
These five groups can only be bought in this package and not individually			
Fatty Acids Package II includes:			
Short chain fatty acids*	0.35 - 0.44%	0.35 - 0.44%	
Medium chain fatty acids*	1.58 - 2.06%	1.58 - 2.06%	
Long chain fatty acids*	0.38 - 3.48%	0.38 - 3.48%	
C:14_0*	0.16 - 1.38%	0.16 - 1.38%	
C:16_0*	0.37 - 4.48%	0.37 - 4.48%	
C:18_0*	0.11 - 1.25%	0.11 - 1.25%	
C18_1*	0.26 - 4.29%	0.26 - 4.29%	
These seven groups can only be bought in this package and not individually			

** FA g/100g milk (applies to all fatty acid profile components). ** Calculated component.*

Ketosis screening

Please see the Application Note no.35.

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

Data output

Real-time display/print-out, storage on hard disk.
Host transmission (RS232) and PC network transmission (TCP/IP).
Data export using CSV files, CS83 protocol or XML.

Standard equipment

Basic analyser incl. table and reagent containers, PC, software.

Optional equipment

Conveyor 4000 or Conveyor Basic, extra containers for reagents, bar code readers, 2D reader, RFID reader, system for sample bottle rotation, extensions for the Conveyor 4000, bottle rack output buffer for the Conveyor 4000, racks for sample bottles, printer.

Standards and Approvals

MilkoScan™ FT+ 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

The MilkoScan™ FT+ techniques comply with:

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

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

Patents

JP: 2547311; 3429000; 364029
CA: 2,132,861; 2,178,627; 2,205,802; 2,212,358
US: 5,252,829; 5,739,034; 5,771,096; 5,933,792
NZ: 251676; 277479; 297385; 300915
AU: 655110; 679821; 691067; 709619
KR: 148750; 216227; 354852; 35876
BR: PI9306145-5; PI9409293.6
EP: 0629290; 0734523; 0796424; 080450

FOSS

FOSS
Foss Allé 1
DK-3400 Hilleroed
Denmark

Tel.: +45 7010 3370
Fax: +45 7010 3371

info@foss.dk
www.foss.dk

GB, December 2015