In-Line Milk Fat and Total Solids Measurement

THE CHALLENGE OF MILK FAT MEASUREMENT

Milk fat content is a defining quality parameter across all dairy products. Whether producing **2% reduced-fat milk** (~2.0% milk fat, ~10–11% total solids), **whole milk** (~3.25–3.5% milk fat, ~12–13% total solids), or **cream products**, milk processors must hit tight milk fat content targets and do so consistently.

Conventional offline analysis of fat content introduces a delay, albeit short, between sampling and result. By the time an offline reading is returned, significant volumes of product may have already been processed. Manual sampling is also intermittent: it cannot detect the transient process upsets such as a sudden separator efficiency change that can cause short-lived quality deviations.

Optical turbidity instruments offer an in-line alternative, but they have a fundamental limitation: their signal saturates when solids content gets too high, meaning they are unreliable for many product streams.

The Kemtrak TC007 overcomes this limitation entirely. Using high-resolution VIS/NIR backscatter reflectance, the TC007 output continues to increase with sample concentration at any solids level, from 0.1% right through to as high as you want to go. There is no upper concentration limit at which the instrument signal saturates and becomes unreliable.

HOW THE KEMTRAK TC007 WORKS

The TC007 is a backscatter photometer. Light is transmitted from the instrument through a fiber-optic cable to a small, hygienic probe installed directly in the process pipeline. The light enters the product and the fraction scattered back towards the probe face is returned through a second fiber for its intensity is measured with high resolution.

Because backscatter intensity is directly and continuously related to particle concentration, including milk fat globules, the TC007 provides an accurate, real-time measure of total solids content across the entire dairy product range.

CONCENTRATION REFERENCE GUIDE

The table below shows how the TC007 product range covers every standard dairy grade.

2% reduced-fat and whole milk are the most common fat standardization targets in consumer milk production. The TC007-SCAT lower range analyzer is the recommended instrument for both.

Product	Fat Content	Total Solids	Recommended Analyzer
Skimmed milk	≤ 0.1%	~8.5 - 9%	TC007-SCAT
1% low-fat milk	~1%	~9 - 10%	TC007-SCAT
2% reduced-fat milk	~2%	~10 - 11%	TC007-SCAT
Whole milk	3.25 - 3.5%	~12 - 13%	TC007-SCAT
Semi-skimmed milk	~1.5 - 1.8%	~9.5 - 10%	TC007-SCAT
Half-and-half	10 - 12%	~18 - 20%	TC007NIR-SCAT
Single cream	18 - 20%	~25 - 28%	TC007NIR-SCAT
Whipping / double cream	35 - 48%	~42 - 55%	TC007NIR-SCAT
Extra thick double cream	50 - 60%	~55 - 65%	TC007NIR-SCAT
Yogurt / cream cheese	Variable	Over 60%	TC007NIR-SCAT

DAIRY APPLICATIONS

Milk Fat Standardization — 2% and Whole Milk

The probe is installed directly in the standardization line where cream is blended back into skimmed milk to achieve the target fat content. The TC007 provides continuous total solids readings that feed directly into the blending control system, enabling closed-loop fat standardization in real time.

The result is the elimination of the slow feedback loop of offline sampling, tighter control around the target fat value, a reduction in product give-away caused by over-fatting, and a guard against under-fat non-conformances.

Separator Control and Optimization

The fat separation step where cream is separated from skim milk is the upstream foundation of fat standardization. A separator operating at reduced efficiency will produce a cream stream that is leaner than expected or a skim stream that is richer, throwing the entire downstream standardization process off target.

With the TC007 installed on the cream outlet, or on the skim stream, or both, any change in separation efficiency is detected immediately. The operator or an automated control system can respond before significant volumes of off-spec product are produced.

Product Identification and Grade Differentiation

Because the TC007 output is directly related to total solids content, it can be used to identify product grade at any point in the dairy, confirming that the right product is in the right line, detecting mix-ups between milk grades or between milk and cream, and verifying correct silo routing during intake.

Leaking Valve Detection

Unexpected changes in the TC007 reading not attributable to a deliberate process change can be a reliable indicator of valve leakage. A small cream leak into a skim milk line will cause a measurable and sustained rise in the backscatter signal, alerting an operator to investigate before the effects are seen in downstream product.

Cream and Cultured Dairy Products

The TC007NIR-SCAT high-range analyzer extends the same reliable monitoring capability to the full spectrum of cream products (single, whipping, double and extra thick double cream) as well as high-solids cultured products such as yogurt and cream cheese.

SELECTION GUIDE

Two TC007 models are available to suit operating range:

TC007-SCAT (Low Range)

Recommended for process streams up to 10% total solids. Ideal for skimmed milk, 1% milk, 2% reduced-fat milk and whole milk standardization lines.

TC007NIR-SCAT (High Range)

Recommended for process concentrations exceeding 10% total solids. In addition to milk processing, use for cream, yogurt, cream cheese, and any other high-solids dairy stream.

Deploying a Kemtrak TC007 in dairy milk fat measurement applications delivers:

- **Precise, continuous fat standardization.** Tighter control of 2% and whole milk fat targets with no sampling delay
- **Immediate detection** of separator faults, valve leaks and process upsets before product quality is compromised
- **Reliable measurement at any concentration**. The TC007 is the only optical in-line instrument that works accurately from skimmed milk through to cream and yogurt
- **Reduced product give-away** through tighter real-time control of fat content
- **Lower risk of non-conforming product** reaching packaging or the market
- **Simplified compliance documentation** through continuous, automated measurement recording
- **Reduced CIP/SIP complexity**. The probe remains installed and operational through cleaning cycles

GET IN TOUCH

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