BÜCHI
SWITZERLAND

NIR-Online®

Dairy Process Solutions

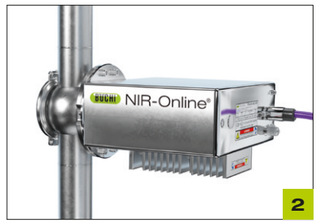
Real-time Process Control for the Dairy Industry

BUCHI NIR-Online® Dairy Process Solutions enable enhanced productivity and higher quality for maximum gross profit margins. We support you in optimizing all stages of production – from incoming raw materials to releasing final products.

Process Optimization for the Dairy Industry
Maximize your quality and profit

BUCHI NIR-Online® offers the most advanced and versatile solutions for the dairy industry available on the market. These solutions continuously provide accurate measurements within seconds to guarantee maximum production efficiency. With real-time trending, conveniently displayed in the control room, your operators can immediately react for process deviations. From low-viscous raw milk to high-viscous spreads, from powders to piece goods – BUCHI NIR-Online® Process Analyzers enable the control of the entire dairy process value chain. These solutions also apply for non-dairy alternative products.

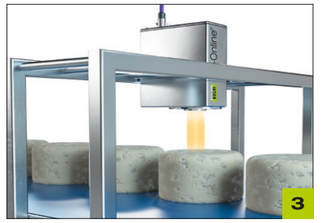
Raw Material Intake
Determine the average quality of each entire truckload to decide upon unloading, rejection and correct storage. Enable full transparency and documentation for correct payment and immediate quality control.



Separation & Segregation
Seperate and segregate according to changing material composition and controlled three-way valve settings. Ensure consistent product quality and seamless processing right from the beginning.

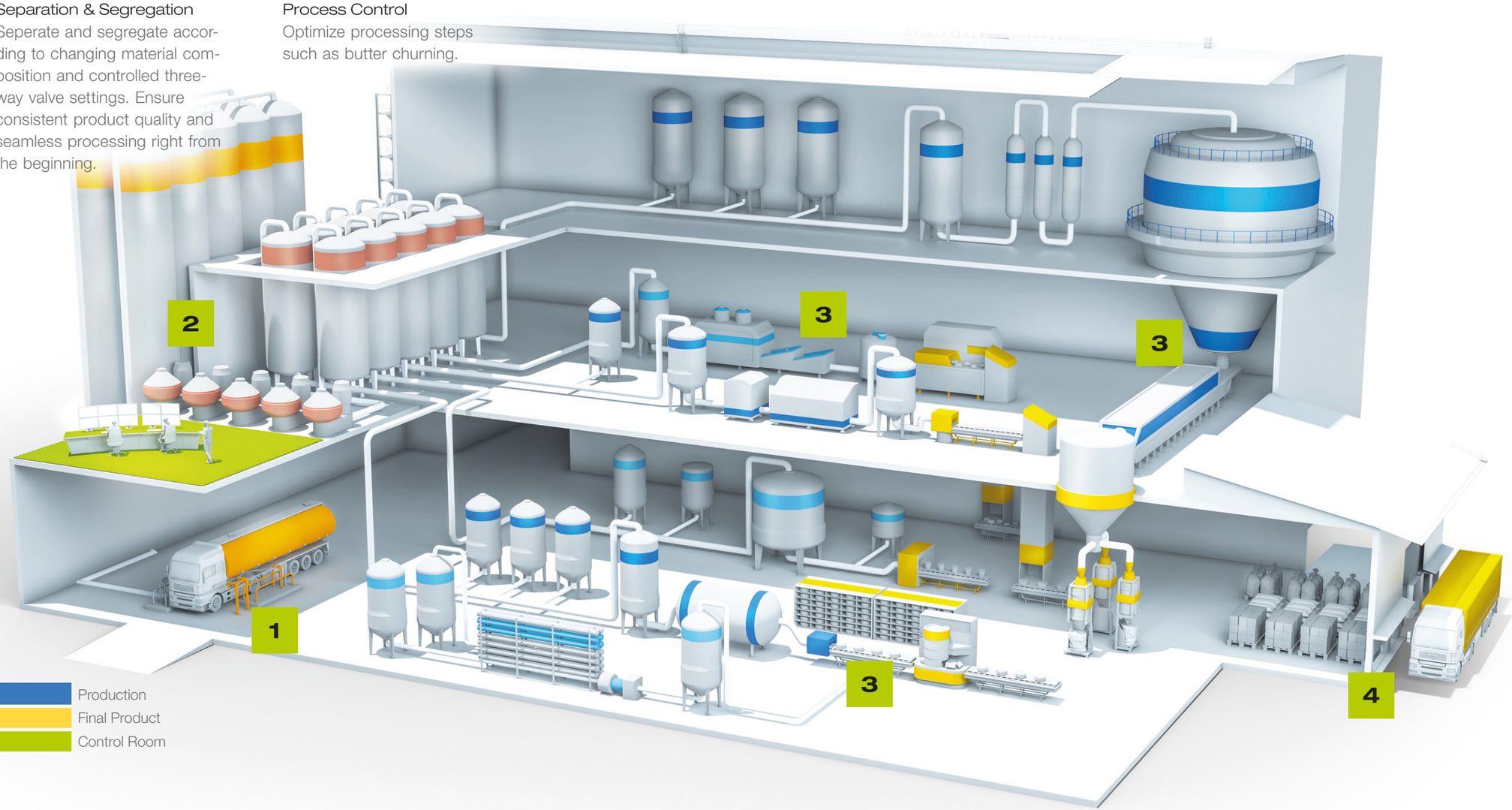
Process Control
Optimize processing steps such as butter churning.

Process Control
Optimize processing steps such as standardization, mixing, heat treatment, and spray drying.



Process Control
Optimize processing steps such as coagulation, fermentation, mixing, melting, cutting, ripening of cheese and filtration of whey.

Final Product
Verify the final product quality independent from its size or consistence.
Document single pieces, batches or entire truck loads before delivery.



Raw Material Intake
Separation & Segregation
Production
Production
Final Product
Control Room

All-in-one Dairy Solutions
Enhancing production and quality

1 Raw Material Intake: online inspection at reception

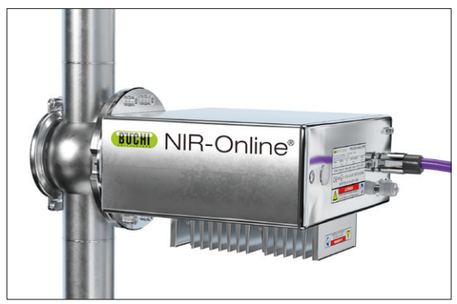
Raw material quality changes not only during the season but also from farm to farm and between different deliveries. BUCHI NIR-Online® Process Analyzers equipped with high-speed diode array technology, allow representative sampling of high product volume and thus real-time information of the incoming material quality. Such on-line inspection control provides base for fast decision making on correct segregation and ensures correct payment to suppliers.

Benefits

- Fast pre-check and control entire truck load
- Determine real average values for correct payment to suppliers
- Ensure product consistency right at the material intake

2 Separation & Segregation: ensuring consistent product quality

Installation of the BUCHI NIR-Online® Process Analyzer directly after the raw material separation enables selective temporary storage and segregation. This ensures the most consistent starting material and optimal resource utilization for the subsequent processing steps. Real-time information provided by the NIR-Online analyzer can automatically be transferred to a process control system to activate three-way valves for the correct silo tank and to adjust variations of the critical-to-quality attributes, such as fat.



Benefits

- Increasing product consistency by fine-adjusted separation
- Automation - control loop with valves for real-time quality segregation
- Improve preparation and efficiency for subsequent process steps

3 Process Control: optimize processing and resources

Continuous information regarding the most critical parameters such as fat, moisture, protein, and more during the processing steps ensures a production close to the targets. This avoids time and costs for the rework of different dairy products.

3.1 Butter

Adjust machinery and recipes during butter churning. Control dosage of whey to reach desired moisture content and guarantee the salt content according to specification.

Benefits

- Maximize machine performance and storage utilization
- Avoid rework, product blends and wastage

3.2 Dairy Powder & Infant Formula

Optimize recipes and heat treatment to improve the quality of various dairy powders and infant formula (e.g. moisture, fat, protein) and reduce undesired coloring and scorched particles.

Benefits

- Reach target values exactly, reduce safety margin
- Automatic visual product inspection documentation of color and scorched particles
- Reduce energy costs

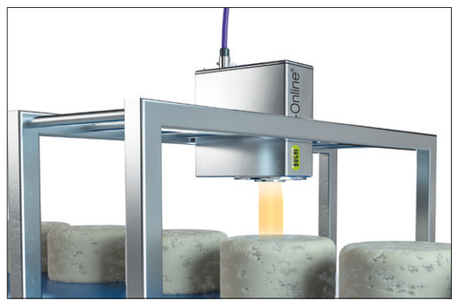
3.3 Ice Cream

Control dosing and mixing for correct recipes, reduce safety margins (e.g. fat, sugar, starch) and adjust freezer.

All-in-one Dairy Solutions
Enhancing production and quality

3.4 Yoghurt
Follow fermentation dynamics and interrupt yoghurt incubation on time for optimal operation capacity (e.g. lactose, pH).

3.5 Cheese
Monitor coagulation, fermentation, mixing, melting, cutting, ripening, and storage of cheese (e.g. moisture, fat, salt).



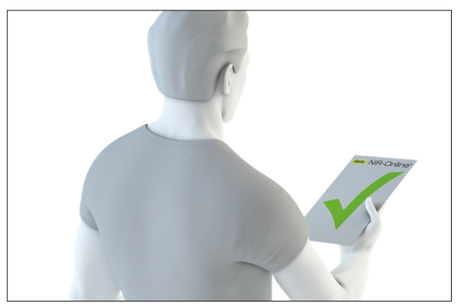
Benefits

- Interrupt coagulation, fermentation, mixing and melting right on time
- Optimize moisture level
- Optimize storage capacity

3.6 Whey / Reverse Osmosis / Ultrafiltration
Segregate permeate and retentate according to specific composition after filtration of whey to improve consistency for subsequent processing, such as cheese production or spray drying.

4 Final Product: verify and document product quality

Verify and document the quality of diverse final dairy products regardless of its consistence. Single pieces, several batches or even entire truckloads can be automatically tracked and reported to the quality management.



Benefits

- Optimized warehouse performance by on-time product ripeness
- Full traceability and documentation of the final product
- Real-time quality assurance before delivery to the customer

Typical Products and Parameters*
for the dairy industry

Raw & Consumer Milk
1 2 3 4

- Fat
- Protein
- Total Solids
- Lactose
- Solids-Non-Fat
- Acidity/Lactic Acid
- Freezing Point

Powders & Infant Formula
3 4

- Moisture
- Fat
- Protein
- Brix
- Color
- Scorched Particles

Butter & Spreads
3 4

- Moisture
- Fat
- Protein
- Salt

Ice Cream & Yoghurt
3 4

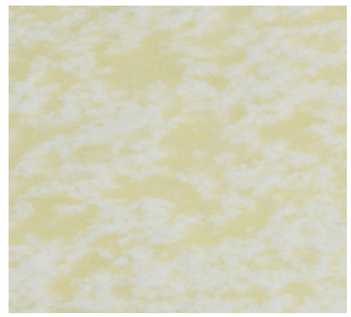
- Moisture
- Fat
- Protein
- Sugar
- Starch
- Total Solids
- pH/Acidity

Cheese: fresh, hard, processed
3 4

- Moisture
- Fat
- Protein
- Salt
- Total Solids
- pH
- Coagulation
- Ripeness

Whey
2 3 4

- Moisture
- Fat
- Protein
- Lactose
- Salt
- Total Solids



* Including non-dairy alternative drinks (e.g. soy-, rice- or almond-milk), yoghurts, and curds (e.g. tofu).

Features and Benefits
Certified safety and ease of use

AutoCal: include reference values yourself with just one click

AutoCal is the most convenient tool available on the market to directly include a reference value into an existing calibration and recalculate measured data accordingly. Your valuable calibration data remains with you at all times - no need to hand it out to external agencies. Simply enter the new reference value into the software and confirm via a simple click. No export/import functions, no manual calibration routines or extensive background in chemometrics are required. With AutoCal you eliminate the need to develop extensive in-house calibrations or purchase calibration data bases.

Certified safety for hazardous environments

Ingress protection

To withstand the rough cleaning conditions of the dairy industry the BUCHI NIR-Online® Dairy Process Solutions are also available with ingress protection IP66K and IP68.
IP66K can be used for powerful water jets with increased pressure (10 bar at 3 m distance) against the device encloser from any direction, causing no harmful effects. IP68 proofs our sensors are suitable for continous immersion in water (depth of >1 m) without producing harmful effects.

Sanitary requirements

BUCHI NIR-Online® Dairy Process Solutions can undergo an electropolishing treatment to reduce product adhesion, contamination and especially the risk of bacterial colonialization. Electropolishing is a process for metal finishing, resulting in a surface leveling which is complete featureless. Such surface leveling significantly reduces fouling, plugging, scaling, product build-up and enables unmatched hygienically and sanitary qualities of the treated equipment. Electropolishing is therefore especially well-known among food, beverage, drug, and chemical industries and broadly accepted in corresponding standards. Average surface roughness of electro polished materials: Ra < 0.8.

ATEX for dairy powder production

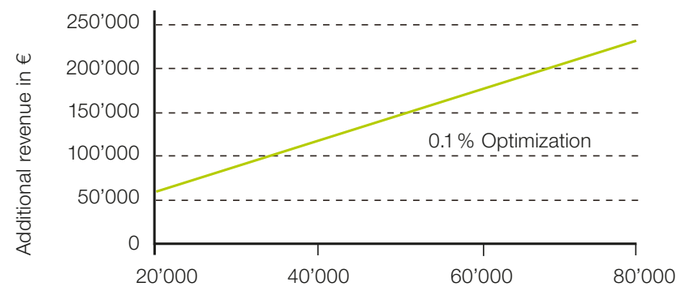
BUCHI NIR-Online® Dairy Process Solutions give rise to uncritical operation in potentially explosive environments. The process analyzer is designed and certified to be used in zones 20 and 21 together with an additional enclosure, and in zone 22 for direct product contact. In the food and drug industry this could be applied in powder processing and packaging. Enjoy full installation flexibility, as additional explosion proof cabinets are not required.

Fast Payback in less than one Year
Optimize your gross profit margins

Save up to 58’000 € per year: optimized moisture in dairy powders

Assuming an average whole milk powder with a moisture content of 3 %, a market price of 3 € per kg and a production volume of 54 tons per day. An increased productivity based on adjusted moisture by only 0.1 % would mean 1 kg more moisture per ton whole milk powder. The potential earning on the adjusted product could reach 162 € per day and 58’000 € per year.

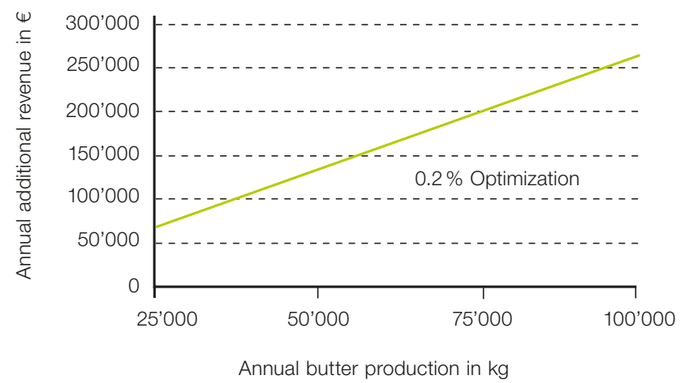
Example: Optimized moisture in dairy powders after spray drying



Save up to 65'000 € per year: fat addition in butter churning

Assuming 1 l of full cream milk with a fat percentage of 4 % results in 0.07142 kg butter of 84 % fat content. A dairy plant processing daily 25'000 l full cream milk could lead to 1'786 kg of butter. With an international price of 5 € per kg butter and optimized processing by fine adjusted reduction in butter fat content of only 0.2 % would enable annual extra revenue of about 65'000 €.

Example: Optimized fat addition during butter churning



After Sales & Service
Competent and fast support

Our service and application specialists support you in all matters related to our solutions. Whether you have questions about our hardware and software specific to your application or your production process, our colleagues and partners on site support you competently and promptly. If required, the local colleagues are supported by an international team of experts from Germany and Switzerland. Send us your request, we look forward to assisting you.

We provide the following services for you as valued customers:

Technical Support in the Planning Phase
· On-site support for installation planning and process integration
· Acceptance of technical installation and commissioning on-site worldwide

Technical Support for Hardware and Software
· by mail (local BUCHI affiliates or service.nir-online@buchi.com)
· by telephone (local BUCHI affiliates or +49 6227 732660)
· via remote connection (service.nir-online@buchi.com)

Application Support
· by mail (local BUCHI affiliates or application.nir-online@buchi.com)
· by telephone (local BUCHI affiliates or +49 6227 732660)
· via remote connection (application.nir-online@buchi.com)

Software Training
· Standard operator training
· Individual training tailored to your needs

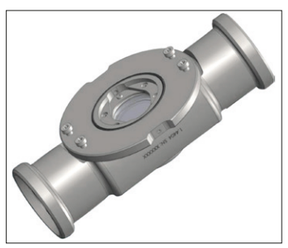
More information & contact at application.nir-online@buchi.com

Technical Data
NIR-Online Process Analyzer

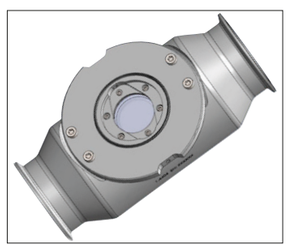
Specifications

Dimensions (W x D x H)	220 x 220 x 135 mm
Weight	7 kg
Max. operating pressure	30 bar at flange
Realtive humidity	<90 % non condensing
Ambient temperature	-10°C – 40°C
Product / flange temperature	-10°C – 70°C (130°C with Water Chiller)
Vibrations	0.2 G at 0.1 – 150 Hz
Electric power supply	110 or 220 VAC ± 20%, 50/60 Hz, 30 W
ATEX / IP Class	II 2D Ex tb [op is Da] IIIC T80°C / T100°C Db Optional: IP66k / IP68 (voids ATEX and camera)
Spectal range	Visible range 350 – 920 nm, NIR range 900 – 1700 nm or 1100 – 2200 nm depending on model and configuration
Detector type	Diode array (InGaAs)
Measuring time	20 spectra/s (V3S 200 spectra/s)
Illumination spot diameter	30 – 40 mm, depending on accessory and optical setup
Imaging	High resolution CCD Camera, 40 µm particle size
Light source	Tungsten halogen dual lamp / 18000 h (2 x 9000 h)
Housing materials	Stainless steel, aluminum cooler (nickel coated), FFKM (standard sealing material; custom sealing upon request)
Interfaces to process control system	TCP/IP, Profibus, Modbus, OPC, SQL, XML/CSV, Analog

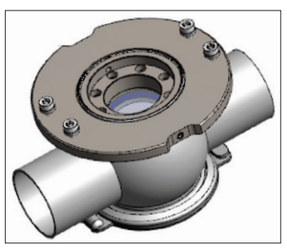
Accessories for process integration*



Milk Pipe DN50 - DIN 11851
Article No.11063029



Tri-Clamp - ISO 2852
11061677



Varinline® DN50 - DIN 32676
11061674

* Electropolishing of all accessories available

Complete your Portfolio
Complementary products

Process Analyzer with X-Rot Module

For laboratory and at-line analysis of pre-delivery samples and back-up laboratory system that may easily be integrated online. Designed for measuring sample surfaces from top.

Process Analyzer Up-view Module

For laboratory and at-line analysis of pre-delivery samples and back-up laboratory system that may easily be integrated online. Designed for measuring sample surfaces from bottom.

Proximate™ NIR

Designed for at-line sample analysis in a glass free environment. With touch-screen user interface, it is suitable to measure inhomogeneous sample surfaces in dual view, from bottom and from top.

Quality in your hands

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