

## **NIR-Online Solutions** Real-time process control

NIR-Online®

BUCHI NIR-Online® Solutions enable enhanced productivity and higher quality for maximum gross profit margins. We support you in optimizing all stages of production - from incoming goods inspection to releasing finished products.



NIR-Online®

## Core messages to our customers

BUCHI creates added value with “Quality in your hands”

“Quality in your hands” is the guiding principle that shapes our philosophy and our actions. It challenges us to provide outstanding services that are precisely tailored to your needs. This means that we must stay in close contact with our customers. That is why we keep in touch and continue to work very hard to understand you and your business even better.

We help you by providing high-quality products, systems, solutions, applications and services that offer you added value. This allows you to focus entirely on your processes and your work.



### Easy

You handle complex processes, do challenging work and want to focus on what is essential. We support you by providing carefully designed solutions as well as instruments and systems that are easy to operate.



### Competent

You need products, systems, solutions, applications and services that are precisely tailored to your needs. We have the technological expertise and decades of experience needed to provide competent support and work with you to continually improve our market services.



### Reliable

You want to be able to rely completely on your partner for products, systems, solutions, applications and services. We guarantee the quality and functionality of our equipment and will continue to help you quickly and efficiently whenever something does not operate to your satisfaction.



### **Cost-effective**

You want to achieve the best possible results using efficient solutions. We help you to handle your jobs and processes economically. We strive to create a high level of economic benefit and maximum added value for you.



### **Safe**

You are working in an environment in which safety is a high priority. By collaborating closely with you, we do everything in our power to make our products, systems, solutions, applications and services as safe as possible for people and the environment.



### **Global**

You value personalized service and short communication channels. As an international family-owned business with our own subsidiaries and qualified distributors, we have a presence wherever our customers are located. Our local staff and the large number of satisfied customers around the world give you the assurance that you are working with the right partner.



### **Sustainable**

You prefer a partner who acts responsibly when it comes to current environmental challenges. We support environmentally friendly processes and manufacture products that have a long service life. We utilize advanced technologies in order to conserve energy and water and leave the smallest environmental footprint possible.



## We offer Process Solutions and beyond Enhancing production and quality

NIR-Online®

Our broad spectrum of turn-key solutions meet the demands of your business ranging from protein determination in food and feed to measuring acidity in biodiesel.

### Food



Benefit from our experience in industries such as

- Bakery
- Dairy
- Flour
- Oil seeds
- Edible oil
- Meat
- Sugar
- Sweets
- Tobacco

### Feed



Maximize gross profit margins in production and blending of animal feeds, such as:

- Cattle
- Fish
- Mixed
- Pet food
- Pig
- Poultry
- Press cakes
- Silage

### Parameters include:

- Acidity
- Ash
- Density
- Fat
- Fertilizer formulation
- Fiber
- Free fatty acids
- Hydroxyl number

## Pharma / Chemical



Optimize production of e.g.:

- Biopharmaceuticals
- Cosmetics
- Fertilizer
- Gypsum and other construction materials
- Polymers
- Soap

- Macronutrients
- Moisture
- Polymerization end point
- Protein

## Specialities



We offer tailor-made solutions for your demands e.g.:

- Biodiesel
- Direct installation on harvesters
- Measuring in blisters / packaging
- Unique sample presentations

- Residual oil, solvents
- Rheological parameters
- Total glycerine
- Total organic carbon, nitrogen

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Find more information:  
[www.buchi.com/nir-online](http://www.buchi.com/nir-online)



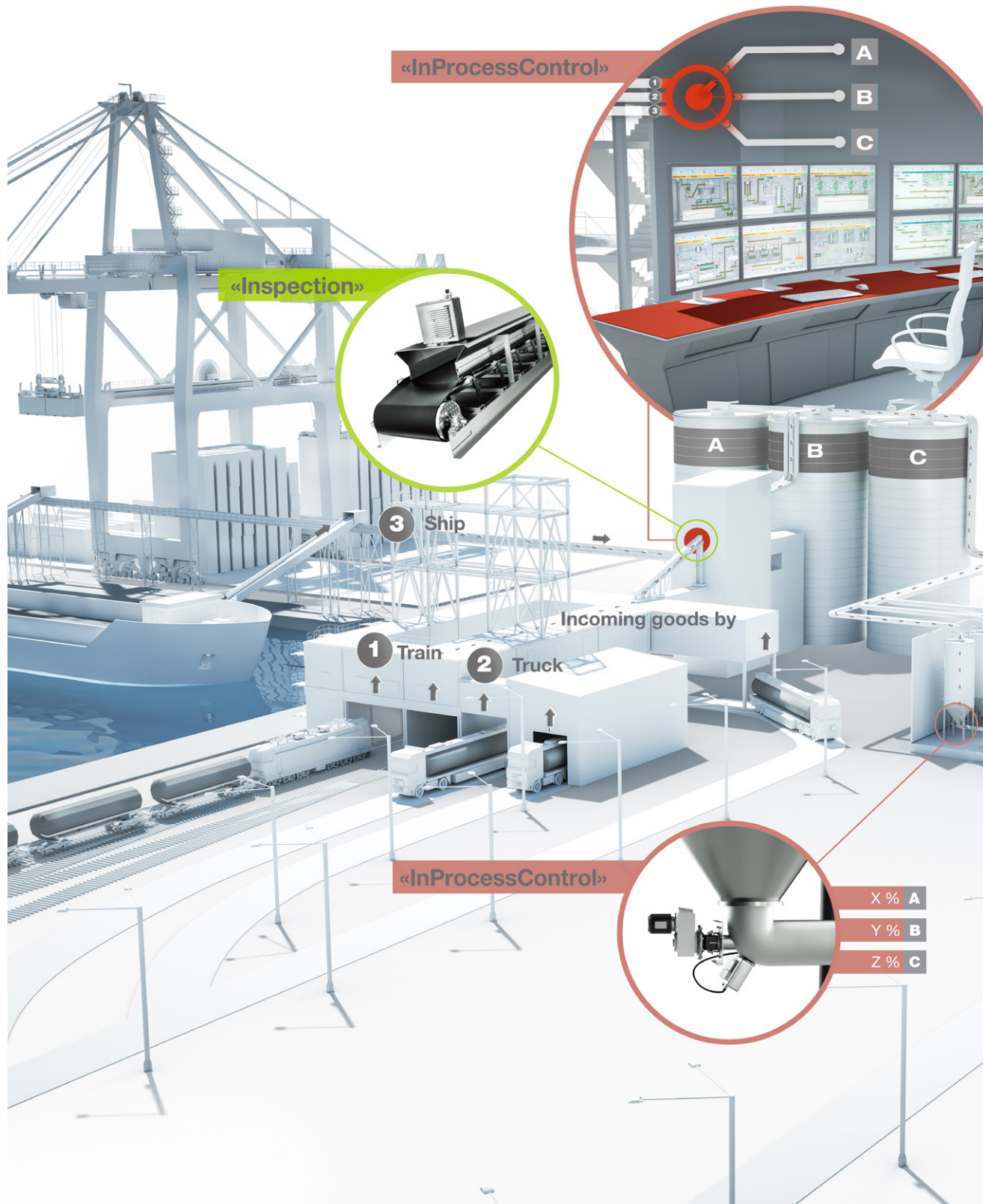




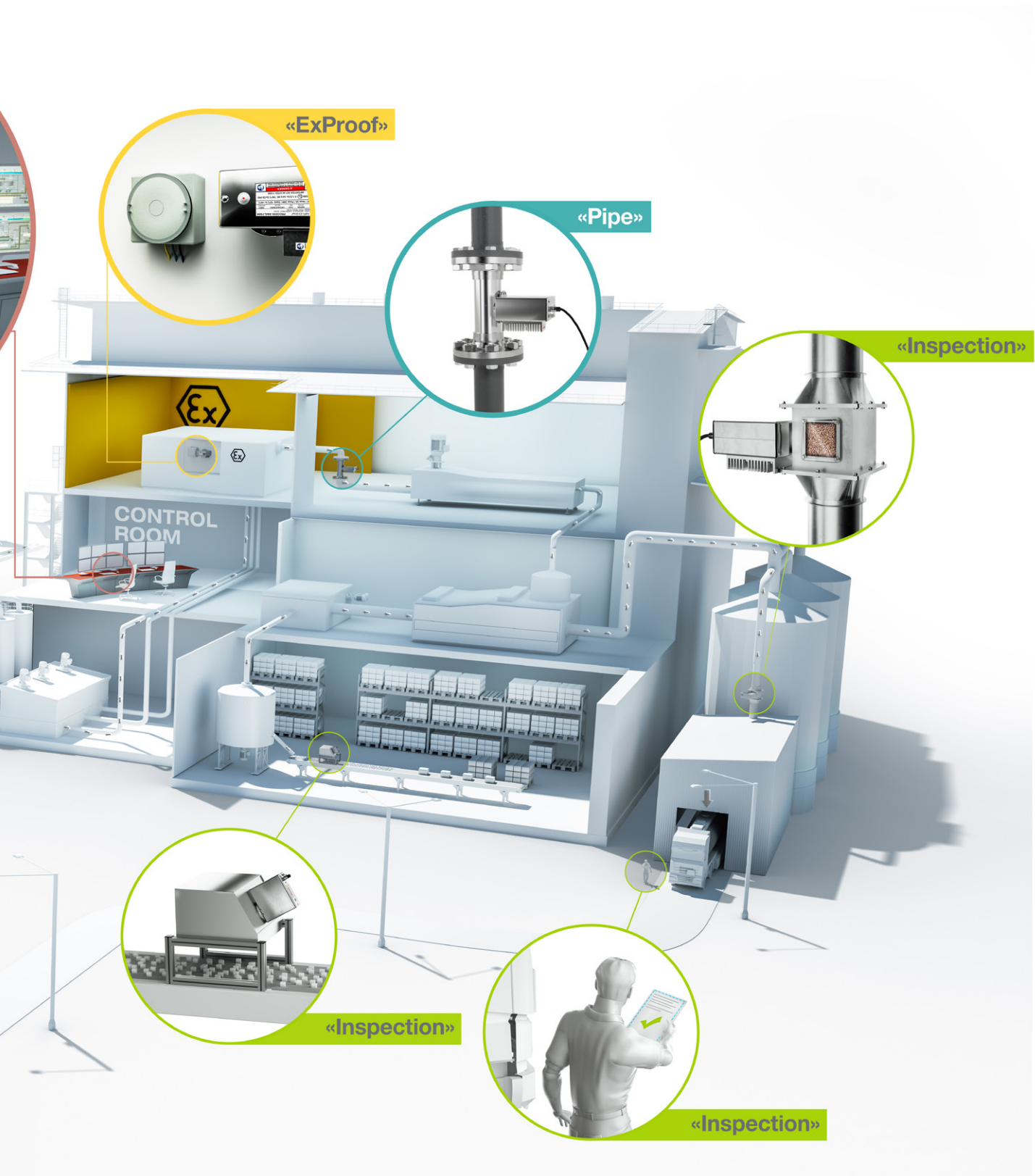
## NIR-Online Solutions Along your value chain

NIR-Online®

We partner with our customers to meet their unique demands. Our enabling solutions range from needs assessment, process and control room integration to the development of innovative products. Competent application support, efficient data management and reporting functions as well as professional technical services complete our offering. Our NIR-Online Solutions span across your entire value chain from incoming goods inspection, production to release control of your finished product.



«Inspection» p. 12	Qualification of incoming / outgoing goods
«InProcessControl» p. 14	Real-time machine / process control in production
«Pipe» p. 16	Liquid products in tubes in production and outgoing goods
«ExProof» p. 18	Measuring in potentially explosive environments in production





## Fast payback in less than one year Optimize your gross profit margins

NIR-Online®

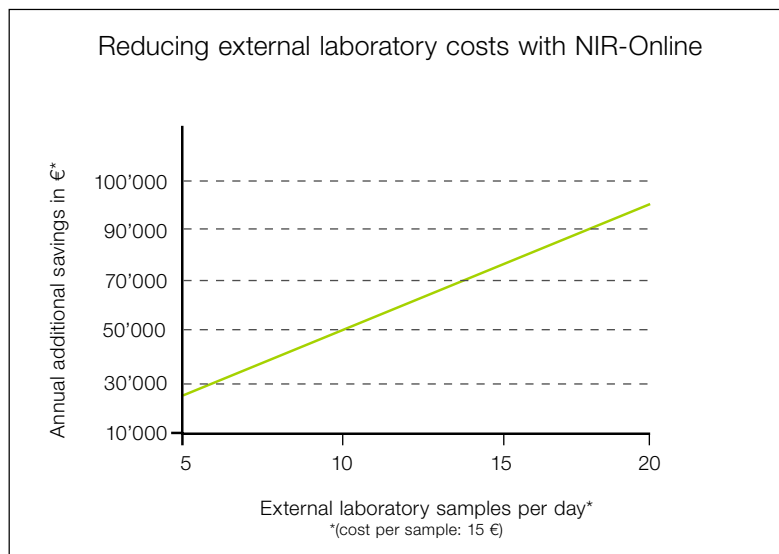
In general NIR-Online customers take advantage of a secure and rapid payback period depending on their annual production and point of installation. Greatly reduce the amount of required in-house or external laboratory analyses with real-time measurements. Moreover, continuous in-process optimization gives rise to even larger additional annual earnings based on increased production.



## Save up to 100'000 € per year: reduce external laboratory costs

Laboratory methods usually do not analyze entire batches, but rely on sampling routines introducing an additional source of error. In case an in-house laboratory does not exist these samples have to be sent out to external partners in addition. Here, payback of an NIR-Online process analyzer directly correlates to the amount of samples and price per analysis charged by external laboratories.

Example: Protein, ash, moisture and fat determination in ground beef



Costly laboratory analysis of ground beef



NIR-Online Process Analyzer attached to a meat grinder



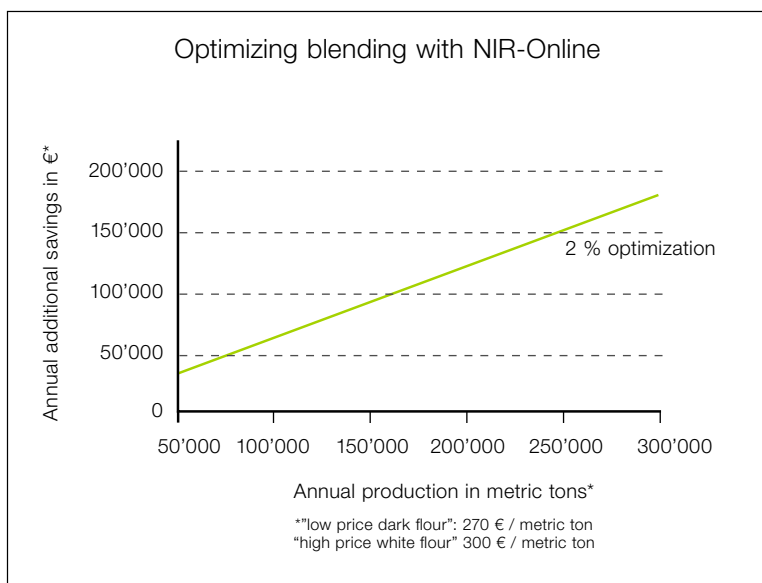


## Save up to 150'000 € per year: optimized process control

Prior to packaging flour is often blended to yield uniform color described by ash content (which also correlates to mineral content). Color / ash may be continuously monitored with NIR-Online process analyzers to yield maximum production efficiency and constant, reliable baking properties of various flours. Payback will depend on the degree of blending optimization meaning addition of “low price dark flour” to “high price white flour” still fulfilling legal requirements, price difference between “high price white flour” (e.g. Type 405\*) and “low price dark flour” (e.g. type 1050\*\*) and annual production.

\* US pastry flour, French 45, Italian 00    \*\* US first clear flour, French 110, Italian 2

Example: Blending of “low price dark flour” with “high price white flour”



Blending optimization with NIR-Online Process Analyzer and bypass sampler.



NIR-Online «InProcessControl» Solution Page 14

Find more application examples on:  
[www.buchi.com/nir-online](http://www.buchi.com/nir-online)





## Process Analyzers

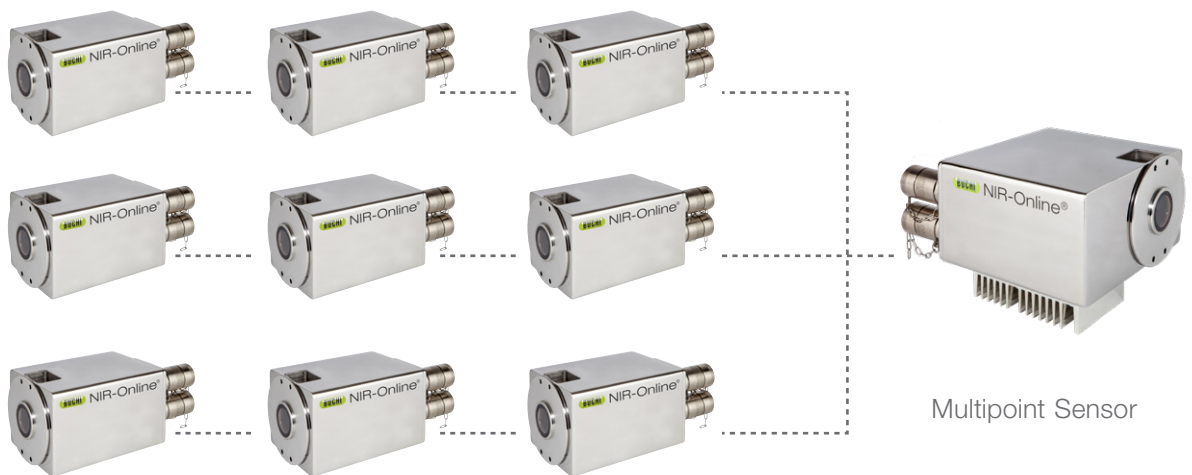
Outstanding characteristics

NIR-Online®

Closely monitoring key parameters such as moisture, protein, fat, ash, starch, fiber or residual oil is crucial to correct deviations occurring in any manufacturing process. BUCHI NIR-Online® analyzers continuously provide accurate measurements within seconds to guarantee maximum production efficiency. To control entire process chains with several check points our innovative Multipoint Sensor and Heads provide the most cost-effective way to monitor your plant.



Process Analyzer



Multipoint Heads and optical fiber

### Your most important benefits

- High speed measurements
- Robust design
- Maximum information
- Continuous operation
- Superior safety

### Additional Multipoint characteristics

- Extend one Multipoint Sensor with up to nine cost-efficient Multipoint Heads through optical fiber
- Budget-friendly daisy chained installation
- Utmost flexibility by modular addition of Multipoint Heads



## Process Integration Outstanding Characteristics

NIR-Online®

Only rapid process integration of NIR-Online sensors ensures a fast return of your investment. Therefore, BUCHI NIR-Online® solutions consists of Process Analyzers and their according integration. We offer a huge, industry-proven hardware adapter portfolio for optimum installation in your existing process. Additionally, we provide a various convenient solutions to directly display all relevant parameters in your database and control room.

### Hardware

#### Process Integration:

Flange, X-Cell, Varinline Adapter, Tri-Clamp, Milk Pipe, Bypass

### Hardware:

Process Analyzer  
Multipoint System

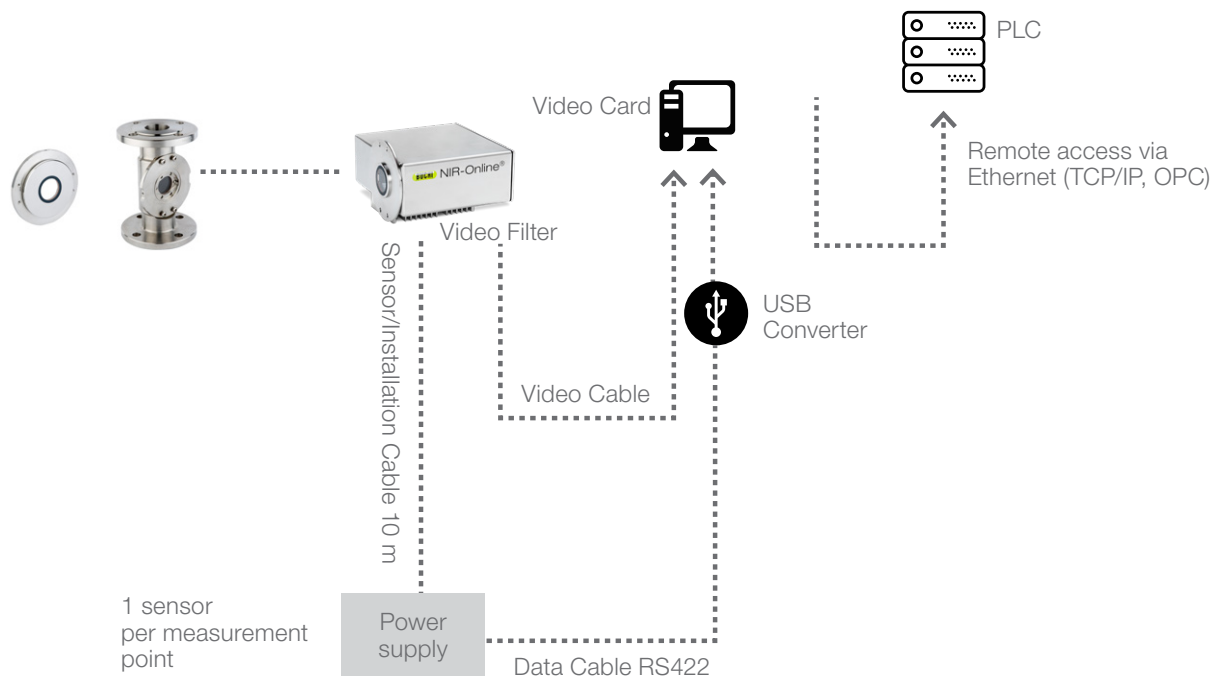
### Control Room/

#### Server:

PC with SX-Suite  
(SX-Center, SX-Mix, SX-Conveyor Belt), AutoCal

### Control Center:

Process Control System integration: e.g. Profibus, Modbus, analog /IO



### Ease of hardware process integration

- Large portfolio of proven accessories for solid, liquid, pasty or viscous or corrosive samples
- Broad temperature and pressure range
- Automatic reference sample collection with by-pass sampler

### Ease of software process integration

- Broad variety of industry standard interfaces e.g. analog I/O, Modbus, Profibus or TCP/IP for convenient data transfer
- Various remote access and server solutions for straightforward integration in existing networks
- Convenient database management via optional SQL integration

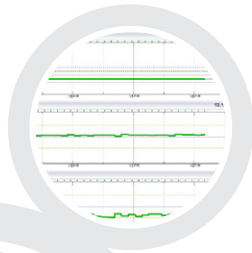


## NIR-Online «Inspection» Solution

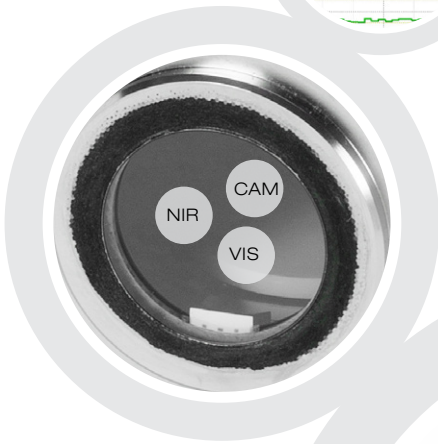
Efficient inspection of all incoming and finished goods

NIR-Online®

BUCHI NIR-Online® offers turn-key solutions for moving materials on various conveyor and elevator systems. The functional interaction of NIR-Online process analyzers and their dedicated software is designed to meet industry demands at all points of production. Incoming raw materials, intermediates or final goods inspection – real-time measurements immediately allow operators to e.g. control incoming goods, segregation, or check entire truck loads prior to customer delivery.



Intuitive software



The only “three in one” sensor



Discontinuous product flow



Process Analyzer



Fast moving goods



## Your most important benefits

### Full control

Real-time measurements of entire incoming / outgoing deliveries

- Maximum certainty with full batch check instead of limited average control samples
- Simultaneous multi-parameter determination for facilitated segregation
- Measuring faster than (un)loading procedure eliminates waiting times of e.g. trucks, trains or ships

### Extensive process expertise

- Accurate measurements at all times thanks to specialized software automatically distinguishing products from interferences of mechanical parts
- Ultra-fast diode array NIR analyzers for e.g. one measurement every 6 mm at a belt speed of 80 m/min
- Perfectly adapted to height fluctuating materials on conveyors thanks to measuring distance of up to 400 mm

### Ease of use

Fully automated:

- Reference sample collection by optional bypass sampler
- Report generation and auditing function for instant documentation
- Calibration function for effortless method optimization

## Your NIR-Online «Inspection» Solution



- Spectral range: NIR, VIS, Camera
- Continuous material flows on e.g. belt conveyors
- Discontinuous material flows on e.g. bucket elevators
- Periodically oscillating products on e.g. screw conveyors
- Fast moving materials



- Basic operation training
- Advanced software training
- Comprehensive reporting
- Remote online support
- Preventive maintenance

*“With NIR-Online process analyzers, we are able to control incoming grains more detailed, reliable and consequent than ever before. Whenever deviations from set quality criteria during unloading are noticed, the delivery will be stopped automatically.”*

Heinrich Matthes, Miller and Owner of “Schlossmühle” Milling Ober-Ramstadt, Germany



## NIR-Online «InProcessControl» Solution

Optimize your production output

NIR-Online®

BUCHI NIR-Online® InProcessControl Solution maximizes your production efficiency and product quality by correcting process deviations immediately. Monitoring e.g. moisture, protein, fat or residual components directly inside a machine indicates when to start or stop a batch leading to maximum output. Additionally, optimum production parameters reduce mechanical wear and tear. The perfect integration of NIR-Online Analyzers to industry relevant standards gives rise to full process control such as multi-component dosage in mixing.



Straight forward  
control room integration

Wireless installation



Process Analyzer



Real-time process control

## Your most important benefits

### Extensive control room expertise

Direct display of key parameters in the existing process control system via

- Modbus
- Profibus
- Datalab IO, TCP/IP, RS422 and various other standards

### Ease of installation

- Wireless BlueTooth integration to rotating machines
- Large adapter portfolio for straightforward integration
- Robust design copes with harsh climate conditions for outdoor installations

### Secure Investment

- Extensive and highly trained service network for fast response
- Online application and service support available
- 24/7 analysis of product relevant parameters at the fraction of costs of laboratory methods
- Average payback period less than one year

## Your NIR-Online «InProcessControl» Solution



- Spectral range: NIR, VIS
- Optimizing settings of grinders via upstream measurements of hardness and moisture
- Continuous dosing of multiple components in blenders within seconds
- Adjusting flow rate and temperature of drying gas, or injected liquid in dryers
- Determining residual oil in extractors to start / stop batches



- Basic operation training
- Advanced software training
- Comprehensive reporting
- Remote online support
- Preventive maintenance

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*"We observe a stable production by complete real-time process control. NIR-Online sensors yield exact information in very short time and for less money than laboratory methods."*

Klaus Selck, Quality Control Manager at Schwarzwaldmilch ("Black Forrest Milk"), Offenburg, Germany

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## NIR-Online «Pipe» Solution

Always full control – even for hot and pressurized materials

NIR-Online®

BUCHI NIR-Online® Pipe Solution gives rise to straightforward installation of our Process Analyzers to pipelines. Maximum installation flexibility is achieved by direct integration of our stainless steel adapters into the pipeline, thus separating the analyzer from the product flow. Our dedicated solution allows easy and reliable real-time determination of key parameters in gaseous, liquid, viscous or pasty products over a large temperature and pressure range. Operators may therefore immediately correct for process deviations maximizing profit margins.



Direct installation  
into tubes



Process Analyzer with  
X-Cell



Fiber Free Port Adapter



## Your most important benefits

### Proven process expertise

- Analyzer is separated from product through robust sapphire window at all times
- Suitable for high product temperatures with optional chiller and for large pressure ranges up to 20 bar
- Cleaning in place with acidic/caustic substances or disinfectants possible via custom sealing materials

### Easy to use

- Simultaneous measurements of multiple parameters
- Direct display of relevant parameters in control room for immediate operator response
- Fully ATEX certified for utilization in potential explosive environments

### Ease of installation

- Large adapter portfolio to various DN, Tri-Clamp, Varinline, milk pipe and custom pipelines
- Reliable measurements of transparent, colored or dark liquids and emulsions via different pathlength adapters
- Fiber Free Port Adapter (FFPA) for straightforward integration to e.g. bioreactors

## Your NIR-Online «Pipe» Solution



- Spectral range: NIR
- Instrument control: SX-Suite V3.0
- PLC integration: SX-Profibus
- Calibration development: SX-AutoCal
- Options: SX-Modbus Interface, X-Cell, weld-in flange, Varinline, milk pipe, TriClamp adapters



- Basic operation training
- Advanced software training
- Comprehensive reporting
- Remote online support
- Preventive maintenance

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*“Traditional analytical methods provide the results after around one day. In the past we were not able to tell whether the individual sampling was prone to outlier or whether the whole process was deficient.”*  
Moritz Lücke, Production Manager, BUNGE Deutschland GmbH in Mannheim, Germany

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## NIR-Online «ExProof» Solution

Certified safety for hazardous environments

NIR-Online®

BUCHI NIR-Online® ExProof solution gives rise to uncritical operation in potentially explosive environments. The process analyzer is constantly over-pressurized, therefore penetration of flammable gases into the system is excluded at all times. Enjoy full installation flexibility, as additional explosion proof cabinets are not required. Moreover, BUCHI ExProof solution is compatible with our large process integration portfolio.



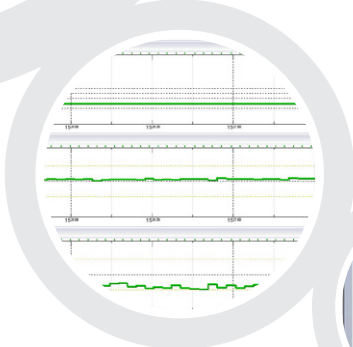
ATEX certified



Multipoint Sensor



Process Analyzer  
with X-Cell



Messung läuft.	
Aczept: MAIS	
Wasser (Feuchtigkeit)	13,5
Rohprotein	7,4
Rohfett	4,0
Stärke	64,6
Rohfaser	2,0
Asche	1,7

## Your most important benefits

### Economical

- Over-pressurized analyzer
  - no expensive explosion-proof cabinet required
  - no costly optical fiber to connect sensor to cabinet required
- AutoCalibration Function® eliminates the need to develop extensive in-house calibrations or purchase calibration data bases

### Ease of use

- Large portfolio of adapters for liquid, solid, pasty and viscos samples
- Time-saving automated report generation and auditing function for instant documentation
- Direct display of key parameters in the existing process control system

### Fast payback

- Average return of investment less than one year
- Immediate process corrections minimize waste and re-work
- Optimization of key parameters for maximum profit margins

## Your NIR-Online «ExProof» Solution



- Spectral range: NIR, VIS
- ATEX certified as:
  - Gas: Ex II 2G Expx IIC T4Gb
  - Dust: Ex II 1/2D Ex tatb IIIC T80 °C DaDb IP65



- Basic operation training
- Advanced software training
- Comprehensive reporting
- Remote online support
- Preventive maintenance

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*“Other comparable analytical systems have no ATEX Gas-Ex-certification. Instead, they are fitted into an explosion-proof cabinet making it necessary to work with optical fiber. This is quite complex and has inferior measuring results compared to an NIR-Online process analyzer.”*

Klaus Klawun, Head of Laboratory, BUNGE Deutschland GmbH in Mannheim, Germany

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NIR-Online®

## AutoCal

Include reference values 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. 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.

### How AutoCal works



1. Press the AutoCal button at the back of the Process Analyzer either directly or remotely. The resulting time stamped sample may be collected automatically with the optional by-pass sampler or manually downstream.



2. Get reference values of time stamped sample from laboratory.



3. Enter laboratory values in SX-Suite. They are directly included in existing calibration and measured data is recalculated automatically.





## SX-Suite

### Intuitive and operator friendly NIR-Online Software

NIR-Online®

BUCHI NIR-Online® intuitive software ensures easy handling, storage and reporting of measured data. Our software solutions are tailor-made to meet process demands. This gives rise to straightforward handling of e.g. discontinuous product flows on conveyor system or mixing processes. Even adhesive samples sticking to the measuring window of the process analyzer are properly recognized. The modular approach grants full flexibility to add further components at any point in time.



#### Extensive Process Expertise

- Turn-key solutions for various conveyor system with SX-Suite Conveyor
- Full control of mixing processes or sticky samples with SX-Suite Mixer
- Convenient and time saving generation of batch, order and QC reports

#### Full integration

- Easy database management with optional SQL output
- Operation from remote computer with SX-Center Remote Client
- Automated back-up function with SX-Backup

#### Ease of use

- Market leading calibration development with AutoCal (see AutoCal)
- Advanced calibration adjustment with SX-Profi
- Simple addition of new components or process analyzers with SX-Config



# The best NIR-Online Solutions for your need

A configuration for every need by industry and sample type

NIR-Online®



Needs/Solutions	Page	Process Analyzer				Possible Process integration	
		NIR	VIS	CAM	Multipoint	Weld-in flange	X-Square
NIR-Online «Inspection»	6	●	●	●	●	●	●
NIR-Online «InProcessControl»	8	●	●		●	●	●
NIR-Online «Pipe»	10	●			●		
NIR-Online «ExProof»	12	●	●		●	●	
<b>Software</b>							
SX-Suite		●	●	●	●	●	●
SX-Mix		●	●		●	●	●
SX-Conveyor		●	●	●	●	●	●
AutoCal		●	●	●	●	●	●
<b>Samples types</b>							
Solid		●	●	●	●	●	●
Liquid		●	●	●	●		
Viscous, pasty		●	●	●	●		
<b>Industry</b>							
Food		●	●	●	●	●	●
Feed		●	●	●	●	●	●
Pharma / Chemical		●	●	●	●	●	●
Specialities		●	●	●	●	●	●



## How do NIR-Online process analyzers work?

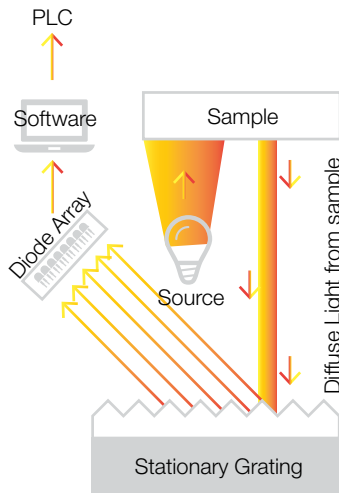


Figure 1: simplified operating principle of an NIR-Online process analyzer

NIR-Online process analyzers rely on the following principle of operation (see figure 1). Light is constantly emitted from a tungsten halogen lamp on a sample. The diffusely reflected light from the sample is directed to a dispersive element (stationary grating) and the resulting spatially distributed monochromatic light is detected by means of a diode array usually consisting of 256 diodes. Each diode collects the intensity of a certain wavelength range depending on its spatial position. These individual diode signals are commonly referred to as pixels. Division of measured intensity ( $I$ ) by intensity of a white reference spectrum ( $I_0$ ) as well as conversion of pixels to a wavelength scale results in a so-called spectrum,  $I/I_0$  plotted against nm or  $\text{cm}^{-1}$ . Chemometric software predicts molecular properties of the sample from the measured spectra after according calibration.

## Is diode array technology advantageous over FT-NIR in a process environment?

Yes, utilizing diode arrays gives rise to detecting a specified wavelength range without time delay in milliseconds. Averaging up to 200 spectra (see FAQ 1) per second yields excellent signal to noise ratio and allows detection of fast moving products in pipes or on conveyor belts (see figure 2). Therefore, measurement errors resulting from natural variance of the sample while averaging are excluded. Moreover, diode array based process analyzers do not contain any moving parts and are thus robust by design. They are perfectly suited for rough industrial conditions such as vibrations, extreme temperatures or humidity.



In a process environment diode array process analyzers are beneficial to scanning or interferometer based technologies. Rotating wavelength filter wheels or Fourier Transform (FT) spectrometers with moving parts results in long measuring / averaging times and quality of measured data relies on stable surrounding conditions.

Figure 2: Diode Array technology allows detection of fast moving goods, e.g. on a conveyor belt.



## Do I need AutoCal?

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Strongly recommended. AutoCal is a simple push or click button allowing to directly time stamp a sample. The sample is manually collected up- or downstream (with the optional by-pass sampler a time stamped sample is even automatically collected!) at a sampling point and subjected to internal or external reference analytics. Afterwards resulting values (e.g. protein, moisture and fat mass percentage) are directly entered into the software. In this example only three numbers for protein, moisture and fat content are typed in and they are automatically included in the calibration. It's really that easy - no export of data and import to external chemometric software with exhausting calibration validation and re-import to analyzer software needed. However, the above described straightforward routine may be replaced by a rather time consuming manual process.



Figure 3: Process Analyzer with highlighted AutoCal Button



More information about AutoCal: [Page 20](#)

## Should I measure in-line or rather at-line / off-line?

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NIR-Online process analyzers yield direct and immediate information regarding a product or intermediate and displays these as real-time trend charts to a control room. Fast intervention of process engineers may either optimize safety / tolerance margins for profit increase or simply reduce batches to waste or re-work. Moreover, entire incoming truck or shiploads or final products may be inspected. Errors resulting from sample taking for laboratory purposes are thus excluded. Therefore, proper storage and correct delivery are ensured.



Immediate information



Optimize safety / tolerance margins



Fast intervention



Less risks for errors

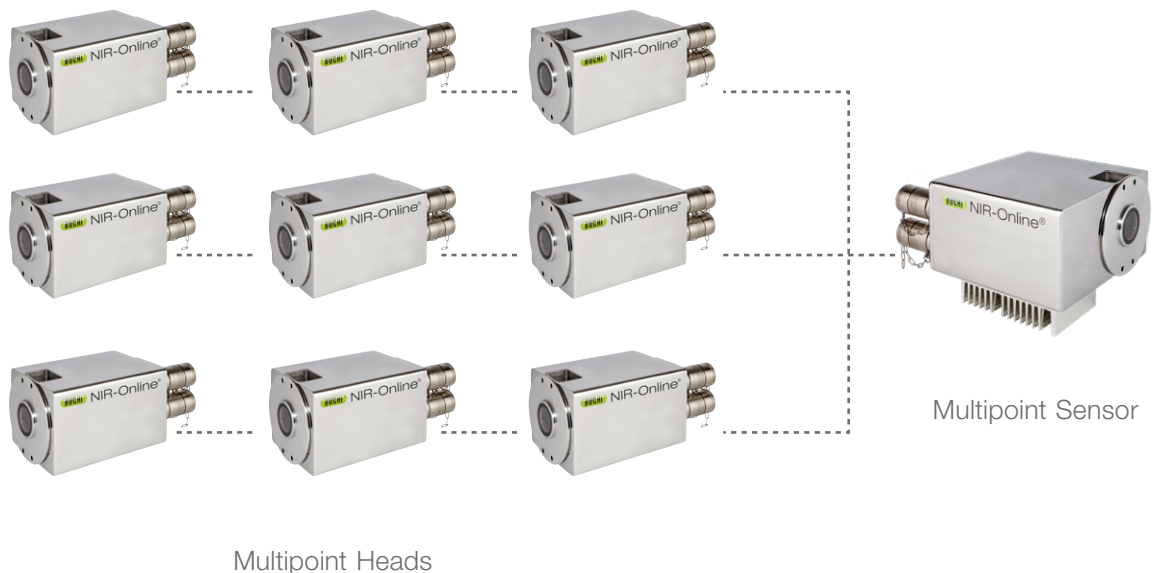
## When should I choose the Multipoint Solution instead of several stand-alone analyzers?

Whenever the cost of optical fibers plus a Multipoint Head exceed the cost of a stand-alone NIR-Online process analyzer. As a rule of thumb the maximum distance between two Multipoint Heads should be less than 150 – 200 m simply owing to cost of investment for optical fiber.

The NIR-Online Multipoint Solution with its patent-pending daisy chain connection is ideal for measuring points at a close distance of up to 150 m e.g. found along a production line or at parallel production lines.

## Do I lose all information when a Multipoint Head in a daisy chain fails?

No, in the unlikely event of a Multipoint Head failure, it will be automatically bridged by an internal relay. All other Multipoint Heads in the daisy chain will continue measuring and the according values will be displayed to the PC / control room.



## Don't optical fibers age and need to be frequently replaced?

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The simple answer is: not in the near-infrared range.

In the low energy, near-infrared wavelength range used by NIR-Online process analyzers only mechanical aging of optical fibers owing to e.g. bending needs to be taken into account. Overall life time is in the order of decades in case of proper treatment. Additionally, any negative effects on the optical fiber are included in the white reference measurement as well as the sample measurement and therefore cancel when determining  $I/I_0$ .

Tremendous aging of glass fiber bundles (signal damping within a fiber) is commonly observed for high frequency irradiation such as ultra-violet (UV) or X-ray leading to glass defects. These lower the degree of total reflection, the fundamental operating principle of an optical fiber. Above described irradiation induced glass defects do not occur in the near-infrared spectral range for mere reasons of physics.

## Don't you lose data because of optical fibers?

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Yes, coupling of light into an optical fiber prior to a measurement always leads to intensity (signal) losses in comparison to a direct measurement. Only beams of light below a certain critical angle given by the numerical aperture may be transported (totally reflected) through the fiber. However, these effects are easily compensated by simply averaging spectra and therefore increasing signal to noise ratio. NIR-Online's fast diode array technology allows to record up to 200 spectra/second. Sufficient SNR is obtained within a second!





## Complete your NIR-Online portfolio

Complementary and related products

NIR-Online®

### NIR-Online Sensor with X-Rot Module



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

### NIR-Online Sensor with UpView Module



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

### NIR-Online Sensor X-Light



For online analysis of samples from a distance with large illumination spot diameter. Suitable for e.g. analysis of entire tobacco leaves.

### NIRMaster



At-line FT-NIR standalone spectrometer available in food-grade PMMA or stainless steel. Accuracy and reproducible performance of polarization FT technology are combined with hygienic design and certified dust protection.

### NIRFlex



The N-500 laboratory FT-NIR spectrometer provides reliable analysis results for quality control as well as research and development in the pharmaceutical, chemical, food, beverage and feed industry.

### KjelMaster



The KjelMaster K-375 is the standard reference technology to calibrate NIR-Online Process Analyzers for protein determination.

## Rotary evaporation



The Rotavapor® R-300 is a comprehensive rotary evaporation solution with sophisticated operating modes to safely evaporate your compounds to dryness.

## Flash Chromatography



The Reveleris® X2 flash chromatography system is an advanced and powerful system that allows the chemist to see previously invisible impurities in e.g. polymers or pharmaceuticals, helping to provide maximum purity and recovery of target compounds.

## Dumas



The DuMaster D-480 enables unattended and fully automated determination of N-protein content according to the Dumas combustion method. Recommended for high sample throughput. Suitable for NIR-Online Process Analyzer protein calibration.

## Spray Drying



The Mini Spray Dryer B-290 is the product of choice for the quick and gentle drying to powder of liquid solutions.

## Extraction



Total fat extraction in full compliance with AOAC regulations with the help of the Extraction Unit E-812 and E-816. Recommended for fat calibration of NIR-Online Process Analyzers.

## Mixer



The Mixer B-400 combines optimal efficiency with simple operation and flexibility where sample homogenization is required.

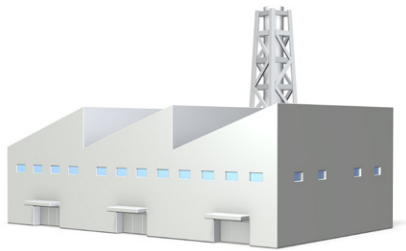


## Support and customer service

From feasibility to preventive maintenance

NIR-Online®

You value an efficient and personalized service. Our network of professional application specialists and service technicians as well as a large number of satisfied customers around the world give you the assurance that you are working with the right partner.



### Installation Support

Our highly trained team of process application specialists will assist in identifying the most beneficial point of installation resulting in accurate and reliable measurements at all times.

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Find more about our installation support at:  
[www.buchi.com/nir-online](http://www.buchi.com/nir-online)



### Application Support

With more than a decade of experience our application specialist ensure checking and optimizing your calibrations as well as calibration transfer.

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Find more about our applications at:  
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### Remote support

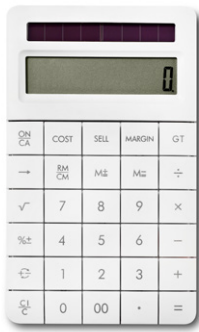
We understand the importance of your production and promises to your customers. Our professional team of service technicians may directly log on the Process Analyzer online for immediate performance checks and support.

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Find more about our remote support at:  
[www.buchi.com/nir-online](http://www.buchi.com/nir-online)







## Payback calculation Support

Can't find your industry in our example calculations on page 8? Based on our market leading experience with NIR online measurements our experts are capable of directly estimating your payback period.

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Find out more about our services:  
[www.buchi.com/nir-online](http://www.buchi.com/nir-online)



## Profit from workshops, trainings and seminars

We regularly offer practical seminars and workshops, often in cooperation with other partners in the field of sample preparation and analysis. Customer contributions thereby underline how our solutions facilitate the daily routine. We also attend many local and international scientific and industrial congresses.

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Find an overview of our activities:  
[www.buchi.com/events](http://www.buchi.com/events)



## Minimize downtimes

Avoid products' downtimes with preventative maintenance and tailored service packages. We offer a product warranty of one year and guarantee ten years of spare parts availability.

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Get in touch with us:  
[www.buchi.com/warranty](http://www.buchi.com/warranty)



## Global Network

Our subsidiaries and qualified distribution partners ensure proximity where ever you are. Since we are familiar with your requirements, we use our experience and knowledge to provide first-rate solutions.

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Get in touch with us:  
[www.buchi.com/worldwide](http://www.buchi.com/worldwide)

BUCHI Affiliates:

Europe

Switzerland/Austria

**BÜCHI Labortechnik AG**  
CH – 9230 Flawil  
T +41 71 394 63 63  
F +41 71 394 64 64  
buchi@buchi.com  
www.buchi.com

Benelux

**BÜCHI Labortechnik GmbH**  
Branch Office Benelux  
NL – 3342 GT Hendrik-Ido-Ambacht  
T +31 78 684 94 29  
F +31 78 684 94 30  
benelux@buchi.com  
www.buchi.com/bx-en

France

**BUCHI Sarl**  
FR – 94656 Rungis Cedex  
T +33 1 56 70 62 50  
F +33 1 46 86 00 31  
france@buchi.com  
www.buchi.com/fr-fr

Germany

**BÜCHI Labortechnik GmbH**  
DE – 45127 Essen  
T +800 414 0 414 0 (Toll Free)  
T +49 201 747 49 0  
F +49 201 747 49 20  
deutschland@buchi.com  
www.buchi.com/de-de

Italy

**BUCHI Italia s.r.l.**  
IT – 20010 Cornaredo (MI)  
T +39 02 824 50 11  
F +39 02 575 12 855  
italia@buchi.com  
www.buchi.com/it-it

Russia

**BUCHI Russia/CIS**  
Russia 127287 Moscow  
T +7 495 36 36 495  
russia@buchi.com  
www.buchi.com/ru-ru

United Kingdom

**BUCHI UK Ltd.**  
GB – Oldham OL9 9QL  
T +44 161 633 1000  
F +44 161 633 1007  
uk@buchi.com  
www.buchi.com/gb-en

Germany

**BÜCHI NIR-Online**  
DE – 69190 Walldorf  
T +49 6227 73 26 60  
F +49 6227 73 26 70  
nir-online@buchi.com  
www.nir-online.de

America

Brazil

**BUCHI Brasil Ltda.**  
BR – Valinhos SP 13271-200  
T +55 19 3849 1201  
F +55 19 3849 2907  
brasil@buchi.com  
www.buchi.com/br-pt

USA/Canada

**BUCHI Corporation**  
US – New Castle, DE 19720  
T +1 877 692 8244 (Toll Free)  
T +1 302 652 3000  
F +1 302 652 8777  
us-sales@buchi.com  
www.buchi.com/us-en

Asia

China

**BUCHI China**  
CN – 200233 Shanghai  
T +86 21 6280 3366  
F +86 21 5230 8821  
china@buchi.com  
www.buchi.com/cn-zh

India

**BUCHI India Private Ltd.**  
IN – Mumbai 400 055  
T +91 22 667 75400  
F +91 22 667 18986  
india@buchi.com  
www.buchi.com/in-en

Indonesia

**PT. BUCHI Indonesia**  
ID – Tangerang 15321  
T +62 21 537 62 16  
F +62 21 537 62 17  
indonesia@buchi.com  
www.buchi.com/id-in

Japan

**Nihon BUCHI K.K.**  
JP – Tokyo 110-0008  
T +81 3 3821 4777  
F +81 3 3821 4555  
nihon@buchi.com  
www.buchi.com/jp-ja

Korea

**BUCHI Korea Inc.**  
KR – Seoul 153-782  
T +82 2 6718 7500  
F +82 2 6718 7599  
korea@buchi.com  
www.buchi.com/kr-ko

Malaysia

**BUCHI Malaysia Sdn. Bhd.**  
MY – 47301 Petaling Jaya,  
Selangor  
T +60 3 7832 0310  
F +60 3 7832 0309  
malaysia@buchi.com  
www.buchi.com/my-en

Singapore

**BUCHI Singapore Pte. Ltd.**  
SG – Singapore 609919  
T +65 6565 1175  
F +65 6566 7047  
singapore@buchi.com  
www.buchi.com/sg-en

Thailand

**BUCHI (Thailand) Ltd.**  
TH – Bangkok 10600  
T +66 2 862 08 51  
F +66 2 862 08 54  
thailand@buchi.com  
www.buchi.com/th-th

BUCHI Support Centers:

South East Asia

**BUCHI (Thailand) Ltd.**  
TH-Bangkok 10600  
T +66 2 862 08 51  
F +66 2 862 08 54  
bacc@buchi.com  
www.buchi.com/th-th

Middle East

**BÜCHI Labortechnik AG**  
UAE – Dubai  
T +971 4 313 2860  
F +971 4 313 2861  
middleeast@buchi.com  
www.buchi.com

Latin America

**BUCHI Latinoamérica  
S. de R.L. de C.V.**  
MX – Mexico City  
T +52 55 9001 5386  
latinoamerica@buchi.com  
www.buchi.com/es-es

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