NIR-Online Solutions
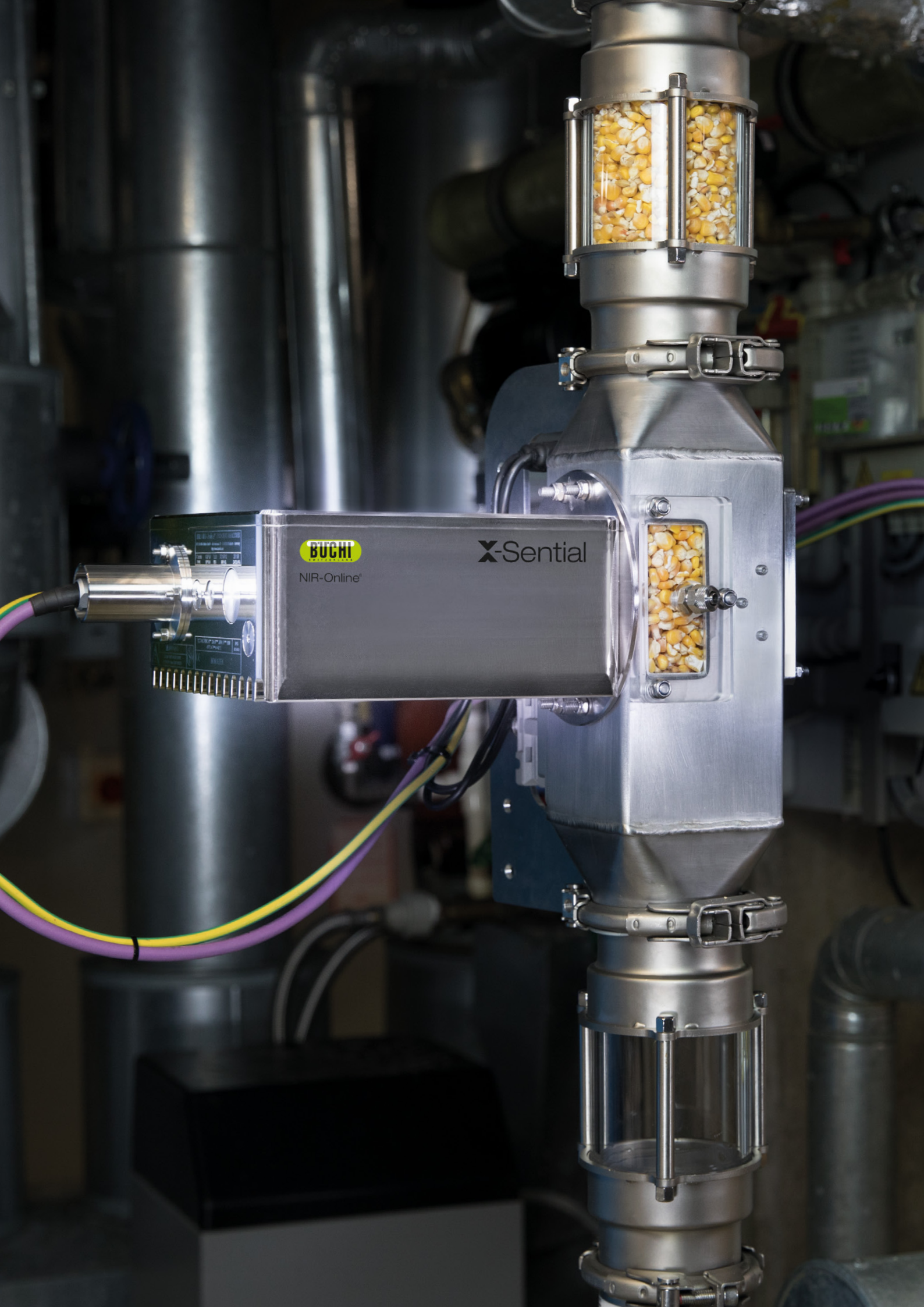Real-time process control

NIR-Online®

NIR-Online Solutions
Main benefits along your value chain

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 and everywhere in between.

Real-time process control
High-speed measurements

Multiple measurement options
All parameters with one sensor

Ease of use
Operator-friendly with unique AutoCal functionality

In a process environment, diode array process analyzers are beneficial for high-speed measurements of fast-moving goods. In contrast to Fourier Transform (FT) spectrometers, no moving parts are used in the optical path, which would cause long measurement times. The robust and industry-proven design handles rough conditions like vibrations, extreme temperatures, wind or humidity.

NIR-Online is the only supplier to combine the benefits of NIR, VIS and a high-resolution camera in an "all-in-one" analyzer dedicated to meeting your needs. This unique combination enables simultaneous measurements such as moisture, protein and ash, as well as visual monitoring of the different steps in the milling industry, including specks counting.

AutoCal is the most convenient tool available on the market for inserting a reference value directly into an existing calibration and for recalculation according to the measurement data. 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 databases.

NIR-Online Solutions
Main benefits along your value chain

Our broad spectrum of turnkey solutions meets the demands of your business ranging from protein determination in food and feed to measuring acidity in biodiesel.

Food

Feed

Application	Raw Material Intake	Segregation & Storage
Needs	· Pre-check samples & entire load control · 100 % control & storage selection at reception · Determine real average values for correct payment · Automatic STOP for low quality · Screen for foreign grain, dockage	· Real-time quality segregation · 100 % control of entire load · Improve efficiency for subsequent blending
Parameters include	· Acidity · Ash · Density · Fat	· Fertilizer formulation · Fiber · Free fatty acids
Solution	**X-Sential™** **X-One**	**X-One** **Multipoint**

Chemical / Pharma

Agriculture / Others

Process Control	Final Products	NIR Lab Analysis
· Produce closer to the target values	· Consistent and precise quality by online control of the entire load	· NIR quality control & calibration development
· Ensure that moisture or protein content, for instance, meet the specifications	· 100 % product traceability and documentation	· Fully compliant with standard reference methods
· Save raw material costs	· Quality standardization	
· Hydroxyl number	· Polymerization end point	· Rheological parameters
· Macronutrients	· Protein	· Total glycerine
· Moisture	· Residual oil, solvents	· Total organic carbon, nitrogen

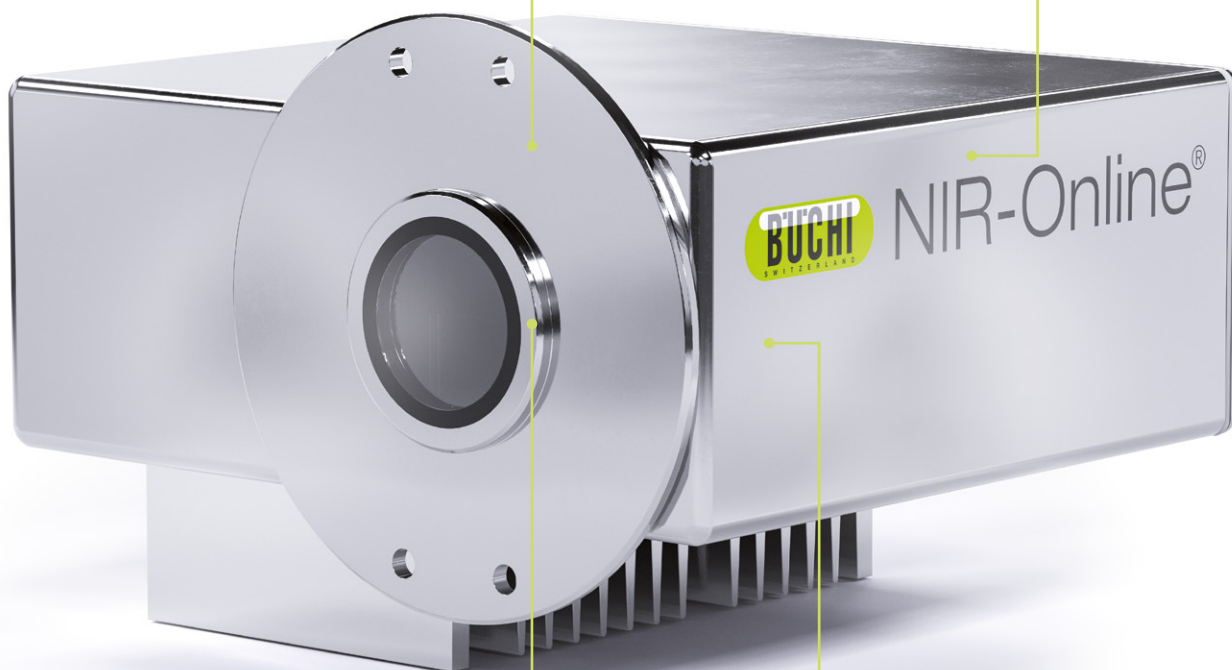| X-One		PA2
Multipoint	X-Sential™	X-One

Industry-proven design
Compact, robust design without moving parts handles rough conditions like vibrations, extreme temperatures, wind or humidity.

Diode array technology
High-speed measurements of fast-moving goods.

Dual lamp
Maximum system availability through automatic switchover to a secondary light source.

ATEX certified
Certified for utilization in potentially explosive gas and dust atmospheres. Superior safety at all times.

X-One Process Analyzer
Outstanding characteristics

Fig. 1: Process analyzer X-One

Fig. 2: X-One with battery pack for bluetooth configuration

Fig. 3: X-One with X-Cell

■ NIR-Online premium

System Portfolio & Technical Features

Dimensions (W × D × H)	220 × 220 × 135 mm
Weight	7.5 kg
Housing material / Casing	Stainless steel (nickel-coated), aluminum cooler
Wavelength options	900-1700 nm (NIR), 350-900 nm (VIS)
Average measurement time	50 up to 200 spectra/s
High-resolution CCD Camera	optional
Max. operating pressure	30 bar at flange
Ambient temperature	-10 °C – 40 °C
Product / flange temperature	-10 °C – 70 °C (130 °C with water cooler)
ATEX Certification	Dust-Ex and Gas-Ex
Ingress Protection Class	IP66, IP66k, IP68
When to use	· for demanding process applications · for fast-moving goods such as conveyor belt installations · for NIR and/or VIS measurements · for visible detections such as for foreign particles · in Dust-Ex or Gas-Ex environments

Industry-proven design
Aluminum nickel-coated housing with IP class IP69/IPX9K. Standard sealing material NBR.

Diode array technology
High-speed measurements of fast-moving goods.
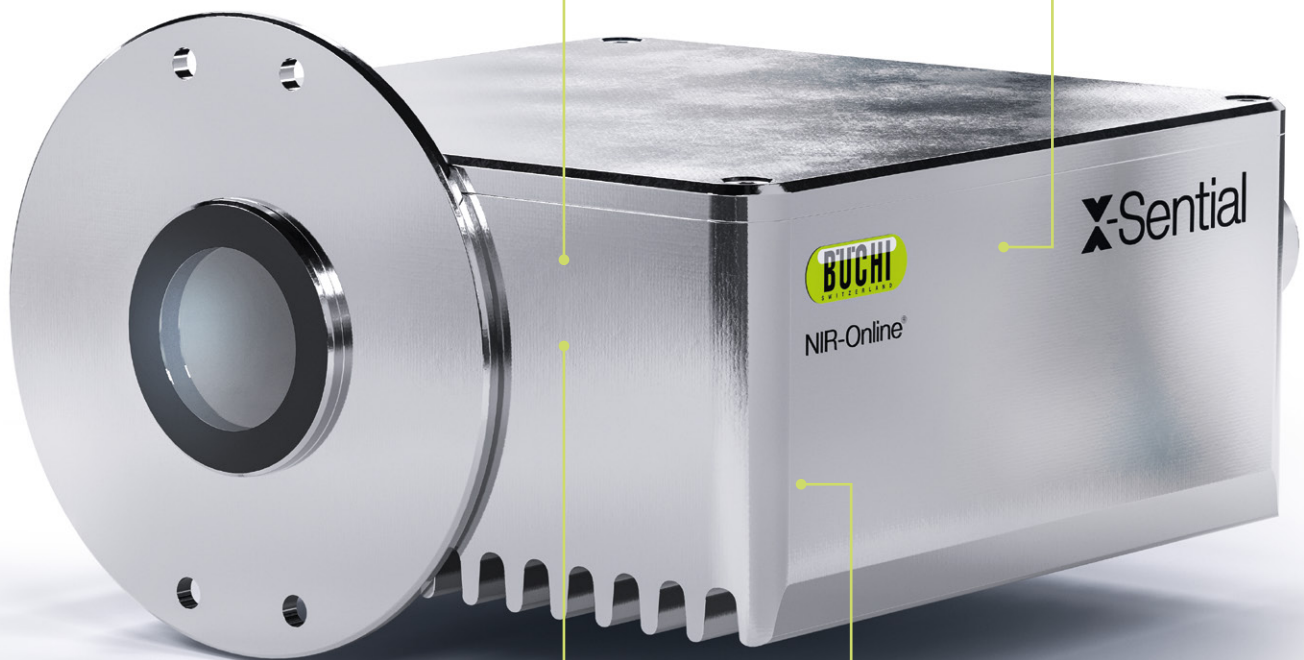
X-Sential

BÜCHI
SWITZERLAND

NIR-Online®

Dual lamp
Maximum system availability through automatic switchover to a secondary light source.

NIR, VIS, or NIR/VIS Version
Flexible use by choosing spectrometer channels for NIR, VIS, or the combination of NIR and VIS depending on the measurement task.

X-Sential™
All that is essential for process control

Fig. 4: Process analyzer X-Sential™

■ NIR-Online essential
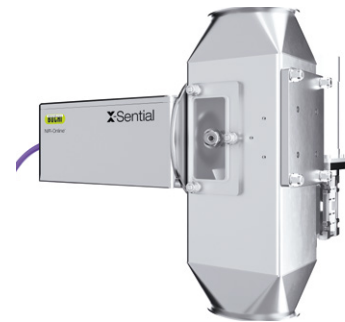

Fig.5: X-Sential™ with X-Cell

Fig. 6: X-Sential™ with XL-Feeder

System Portfolio & Technical Features

Dimensions (W × D × H)	200 × 200 × 100 mm
Weight	5 kg
Casing	Aluminium (nickel-coated), SS 316L 1.4404 flange
Wavelength options	900-1700 nm (NIR), 350-900 nm (VIS)
Average measurement time	20 spectra/s
Max. operating pressure	30 bar at flange
Ambient temperature	-10 °C – 40 °C
Product / flange temperature	-10 °C – 70 °C (130 °C with water cooler)
ATEX Certification	General purpose only
Ingress Protection Class	IP69/X9K
When to use	· for monitoring basic parameters such as moisture, fat, or protein · developed and designed to be the best cost-efficient choice for your manufacturing processes · for general purpose only

Industry-proven design

Robust design handles harsh conditions such as vibrations, extreme temperatures, wind or humidity. IP class IP65.

Dual lamp

Maximum system availability through automatic switchover to a secondary light.

Daisy chain connection

Reduction of costly optical fibers through the patented daisy chain connection of the Multipoint heads.

Multipoint heads

Extendable multiple measuring points with up to nine Multipoint heads sharing one Multipoint sensor.

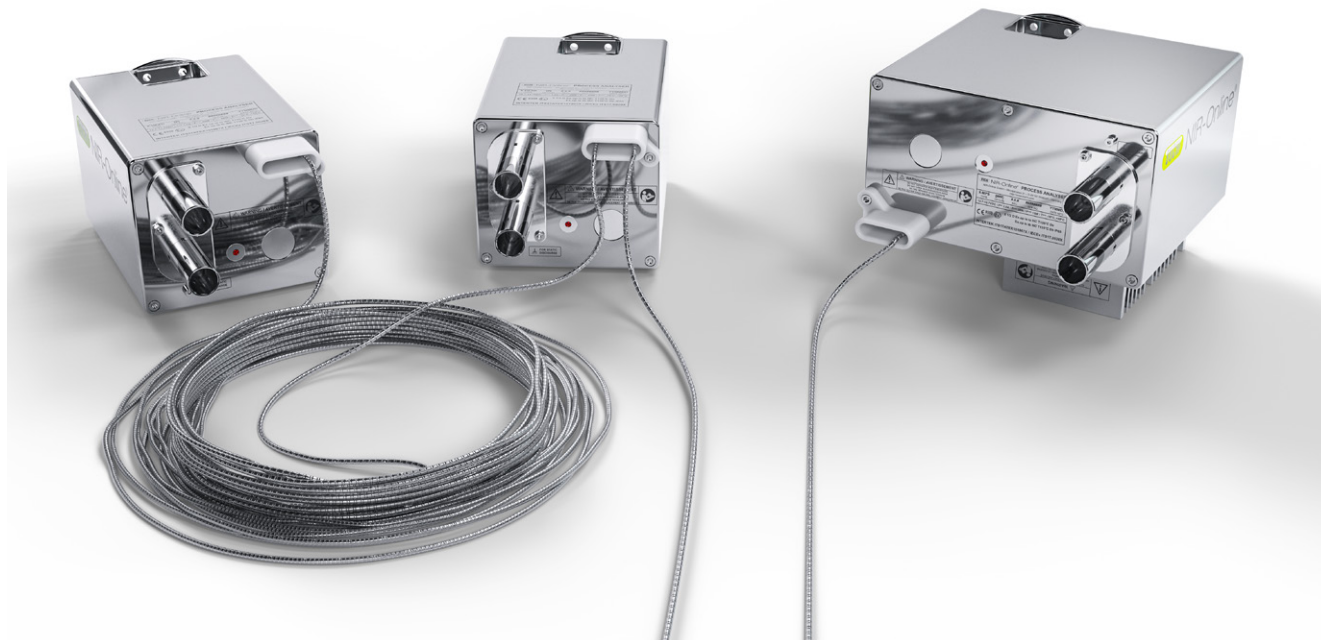# Multipoint System
For up to ten measurement points in parallel

Fig. 7: Multipoint sensor and 2 Multipoint heads with patented daisy chain connection

System Portfolio & Technical Features

Dimensions (W × D × H)	Multipoint Sensor 235 × 230 × 180 mm Multipoint Head 150 x 230 x 130 mm
Weight	Multipoint Sensor 10.5 kg Multipoint Head 6.6 kg
Housing material / Casing	Stainless steel (nickel-coated), aluminum cooler
Wavelength options	900-1700 nm (NIR)
Max. operating pressure	30 bar at flange
Detector	Multipoint Sensor: diode array Multipoint Head: none
Ambient temperature	-10 °C – 40 °C
Product / flange temperature	-10 °C – 70 °C (130 °C with water cooler)
ATEX Certification	Dust-Ex
Ingress Protection Class	IP65
When to use	· for up to 10 measurement points in parallel · for NIR measurements · in Dust-Ex environments

Industry-proven design

Compact, robust design without moving parts handles rough conditions like vibrations, extreme temperatures, wind or humidity.

Active cooling

Water cooling and optional fan cooling for lab use.

NIR-Online®

Extended NIR wavelength

Wavelength range 1100-2200 nm for extended spectrometer range applications.

ATEX certified

Certified for use in potentially explosive dust atmospheres. PA2 with active air cooling voids ATEX.

PA2
for extended spectrometer range applications

Fig. 8: Process analyzer PA2

Fig. 9: PA2 in lab version

System Portfolio & Technical Features

|	
Dimensions (W × D × H)	235 × 230 × 180 mm
Weight	14 kg
Housing material / Casing	Stainless steel (nickel-coated), aluminum cooler
Wavelength options	Extended NIR wavelength range (1100-2200 nm)
Max. operating pressure	30 bar at flange
Ambient temperature	-10 °C – 40 °C
Product / flange temperature	-10 °C – 70 °C (130 °C with water cooler)
ATEX Certification	Dust-Ex. Lab Version voids ATEX
Ingress Protection Class	IP66
When to use	· for extended spectrometer range applications · in Dust-Ex environments

X-Beam
For overbelt applications
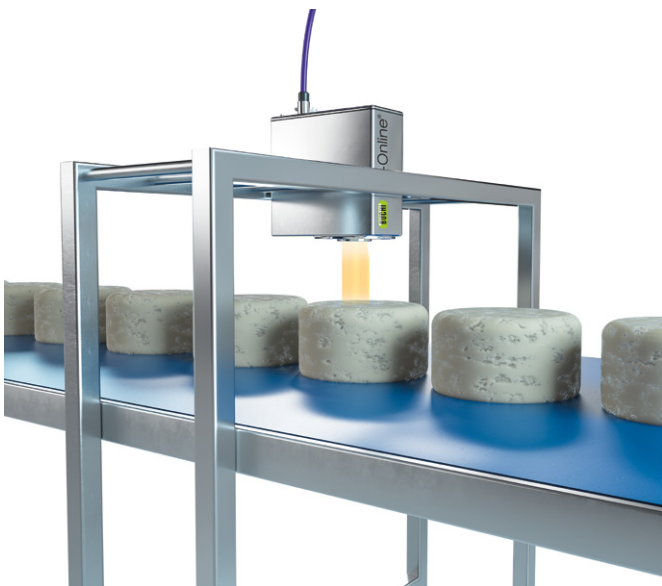
Fig. 10: Process analyzer X-Beam

Fig. 11: Purge Adapter

System Portfolio & Technical Features

The X-Beam has the same outstanding characteristics as the premium NIR-Online process analyzer. However, there are some tailor-made differences to meet the demands of overbelt measurements, such as a measurement distance up to 200 mm.

Differences to standard process analyzers

Measurement spot	40-100 mm depending on accessory and optical setup
Measurement distance	up to 200 mm
Recommended accessory	Purge Adapter: Keeps dust and liquid drops away from the measurement window
Lamp module	Single lamp module
ATEX Certification	Dust-Ex & Gas-Ex
When to use	for overbelt applications with a larger measurement distance up to 200 mm

X-Light
For overbelt applications

Fig. 12: Process analyzer X-Light

### System Portfolio & Technical Features

The X-Light has the same outstanding characteristics as the premium NIR-Online process analyzer. However, there are some tailor-made differences to meet the demands of overbelt measurements, such as a larger measurement spot up to 400 mm in diameter.

Differences to standard process analyzers

Measurement spot	up to 400 mm diameter
Measurement distance	up to 500 mm
Lamp module	Dual lamp module (50 W)
ATEX Certification	no ATEX
When to use	for overbelt applications with a larger measurement spot up to 400 mm

Product overview
The best solution for your needs
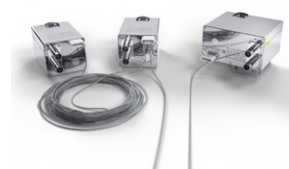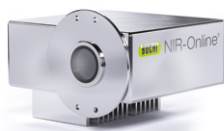
|	Process Analyzer	X-Sential™	Multipoint System
Applications			
Raw Material Intake	●	●	●
Segregation & Storage	●	●	●
Process Control	●	●	●
Final Products	●	●	●
Lab Analysis	●	●	–
Process Environment			
ATEX Certification	Dust-Ex & Gas-Ex	General purpose only	Dust-Ex
Sample Types			
Solid	●	●	●
Liquid	●	●	●
Viscous, pasty	●	●	●
Industries			
Food	for demanding process application	for basic parameters	for up to ten measurement points in parallel
Feed	for demanding process application	for basic parameters	for up to ten measurement points in parallel
Chemical / Pharma	for demanding process application	for basic parameters	for up to ten measurement points in parallel
Agriculture / Others	for demanding process application	for basic parameters	for up to ten measurement points in parallel

PA2	X-Beam	X-Light	FFPA
–	●	–	–
–	–	–	–
●	–	–	●
–	●	●	–
●	–	–	–

PA2	X-Beam	X-Light	FFPA
ATEX Certification with water cooling. Lab Version voids ATEX	Dust-Ex & Gas-Ex	General purpose only	General purpose only

PA2	X-Beam	X-Light	FFPA
●	●	●	–
●	–	–	●
●	–	–	–

PA2	X-Beam	X-Light	FFPA
for extended spectrometer range applications	for overbelt application	for overbelt application	–
for extended spectrometer range applications	for overbelt application	for overbelt application	–
for extended spectrometer range applications	for overbelt application	for overbelt application	for applications in bioreactors
for extended spectrometer range applications	for overbelt application	for overbelt application	–

NIR-Online process adapters
for solid and bulk sample material
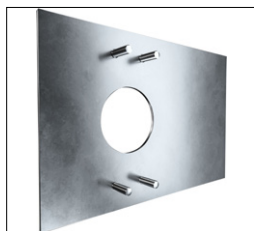
Weld-In Plate (11060753)

Accessory to install the sensor in direct contact with the product.
Process Type: continuous, discontinuous and batch processes

Weld-In Flanges

Accessories to install the sensor without direct contact to the product.
Weld-In Flange (11060754)
Weld-In Flange Pipe (11068800)
Weld-In Flange Hopper (11068801)
Process Type: continuous, discontinuous and batch processes

Bypass Sampler (11061670)

Accessory for a good product presentation in product streams of different densities.
Process Type: continuous and discontinuous processes

X-Square (11061669)

Accessory to install the sensor into the product stream or bypass.
Process Type: continuous and discontinuous processes

XL-Feeder (11068870)

The XL-Feeder is made for all kind of solids and powders which appear in food and feed production.
Process Type: continuous and discontinuous processes

NIR-Online process adapters
## for liquid, pasty and pumpable sample material

X-Cells
The X-Cells are an accessory to install the sensor into pipes.
X-Cell types: DN 50-DN 170, Path length 1-26 mm, 10-20 bar
Process Type: continuous, discontinuous and batch processes

4 Edge X-Cells
The 4 Edge X-Cells are an accessory to install the sensor into pipes.
X-Cell Types: DN 50, Path length 34 mm, 3 bar
Process Type: continuous, discontinuous and batch processes
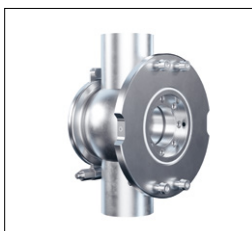
Varinline® Adapters
The Varinline® adapters are an accessory to install the sensor into pipes.
Varinline® types: DN 40-DN 150, Path length 1,5-10 mm, 10 bar
Process Type: continuous, discontinuous and batch processes

Milk Flanges
The X-Cell Milk Flanges are an accessory to install the sensor into pipes.
Milk flange types: DN 50, Path Length 1-15 mm, 10 bar
Process Type: continuous and discontinuous processes

Triclamp (11061677)
The X-Cell Triclamp is an accessory to install the sensor into pipes.
DN 76, Path length 92 mm, 20 bar
Process Type: continuous and discontinuous processes

NIR-Online process adapters
Laboratory Solutions

X-Rot Module (11061754)
The X-Rot module is an accessory for laboratory measurements.

Up-View Stand (11061702)
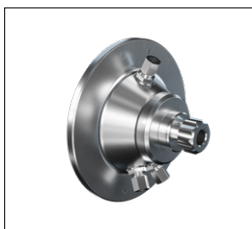The Up-View Stand is a frame to mount the sensor for Up-View measurements.

X-Feeder (11061697)
The X-Feeder is an accessory for NIR-Online laboratory measurements of free-flowing products.

X-Cuvette (11061710)
The X-Cuvette is a quartz-glass cuvette for measurements with X-Cuvette Holder (11061711).

X-Flow Module (11061712)
The X-Flow module is an accessory for qualitative and quantitative determination of pumpable liquids.
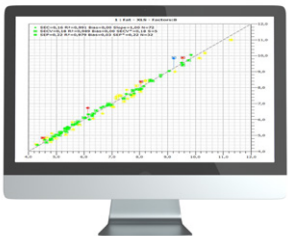
Online Simulation Cell Up-View (11068806)
With the Online Simulation Cell (OSC) you can simulate an online measurement with the correct optical path to the product.

SX-Suite, SX-Plus and AutoCal
Intuitive and operator-friendly NIR-Online software

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 ensures straightforward handling of continous and discontinous product flows on conveyor systems or mixing processes. The modular approach delivers full flexibility to add further components at any time. Client solutions support the display of data on different devices in the network.

SX-Suite	SX-Plus	AutoCal

- · Intuitive user interface provides the interpretation of instrument data and structures it to monitor, control and document the process.
- · Easy visualization of trend charts, current measurements, and video signals support the operator's daily routine for process control.
- · Journal function enables collection and management of reference data.
- · Convenient and time-saving generation of batch, order, and QC reports.
- · Configurable to manage measurement of online processes as well as in the laboratory.

- · Toolbox to create, update and optimize calibrations.
- · Support of explorative data analysis and data mining by graphical visualization of data structures in 2D/3D plots, time series and charts.
- · State-of-the-art regression methods available to suit the specific demands, including quantitative and qualitative algorithms.
- · Easy combination and merging of different data sources for development of multi-sensor calibrations in a network.

- · AutoCal is the most convenient tool available on the market to create and maintain calibrations.
- · Calibration update made easy: Enter the new reference value into the software and confirm via a simple click to recalculate the calibration with your latest data.
- · No manual calibration routines or extensive background in chemometrics are required.
- · Eliminate the need to develop extensive in-house calibrations or purchase calibration data bases.

Ease of use

- · Easy database management with optional SQL output
- · Operation from remote computer (e.g., QC Lab) by SX-Center client solution
- · Web-based HMI for displaying measurement and trend charts on any device in the network
- · Automated back-up function with SX-Backup data storage
- · Control instrument directly with your Process Control System by industry-standard interfaces

Process Integration & Communication
Data Connectivity

We see ourselves not only as a solution provider for online quality control, but also as a consultant and reliable partner for our customers before, during and after the project phase. Only a rapid process integration of the NIR-Online sensors ensures a fast return of investment. This also includes fast and smooth data transfer and

Process Adapters

Process Analyzers
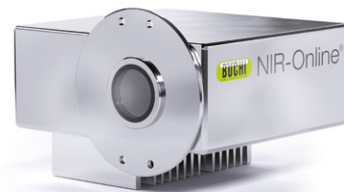
Sensor Cable 10 m

——— Power

——— Data

Smart iBox
Solution with embedded PC, SX-HMI operator interface and build-in touch screen optional

communication. A broad range of industry-standard interfaces such as TCP/IP, OPC UA, Modbus TCP, Profibus or analog output provide convenient data transfer. This allows you to display all relevant parameters directly in your database and control room.

Software
SX-Suite & AutoCal

Data Connectivity

PLC

LAN / PLC Connection

User Interface
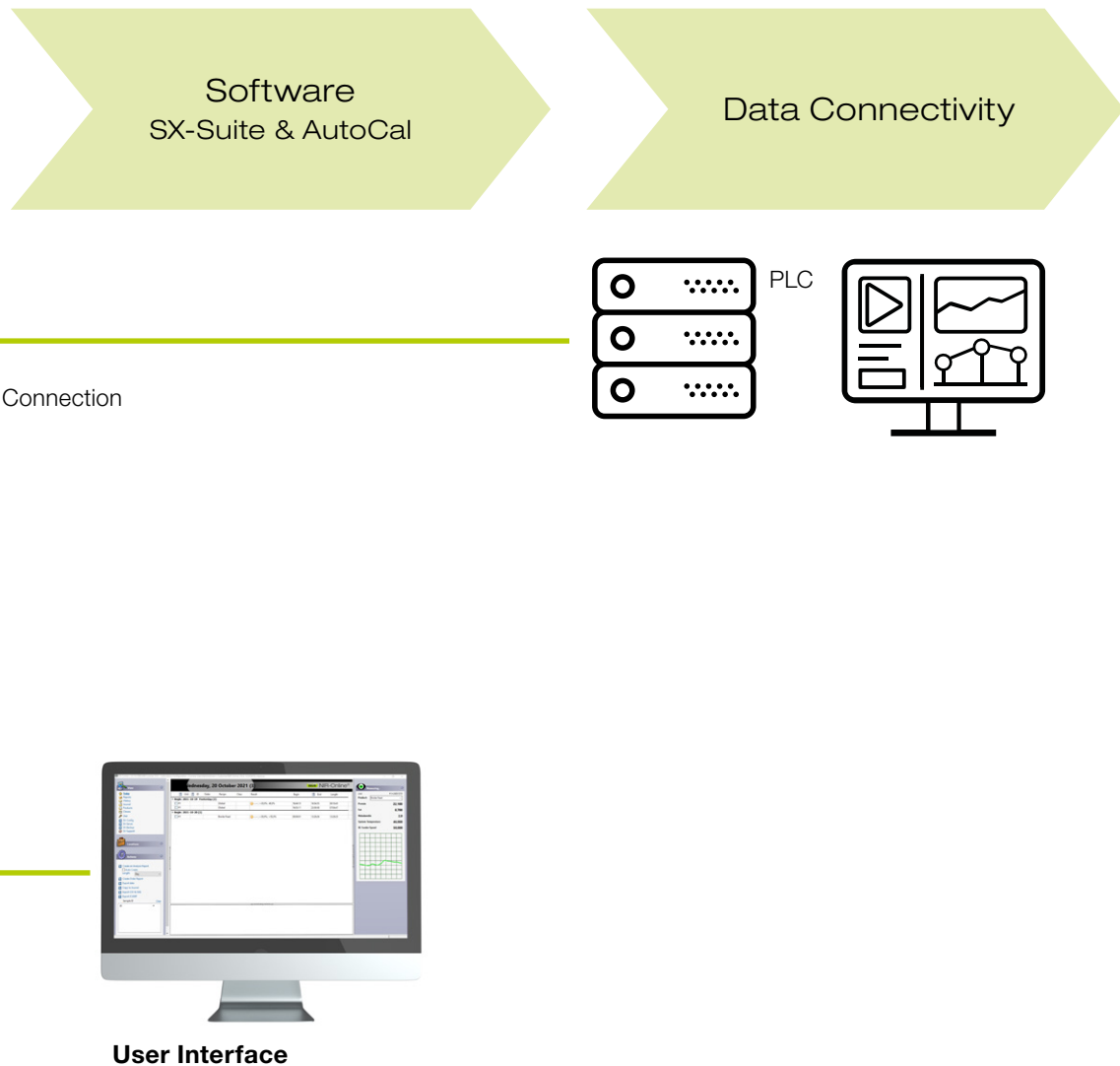
Ease of process data communication

· Remote access and local server solutions for straightforward integration in existing networks
· Convenient database management via optional SQL integration

After-Sales & Service
Competent and fast support

The service and application engineers at BUCHI NIR-Online® have in-depth knowledge of measurement technology and applications. They support you throughout the project implementation, from the selection and use of mounting accessories, to the right choice of process analyzer configuration, to software operation. Our experts are also available to assist you with any issues that may arise in your day-to-day work with our hardware and software. They will help you optimize your results and get the most out of your high-quality equipment. We support you both remotely and directly in your process environment. Or you can opt for one of the service packages:

BNO Start Install — The highest efficiency from the very beginning
· Site inspection/hardware and software installation for 1-2 sensors
· On-site introduction
· Calibration development & support/quality check until 3 months after installation
· Operator software training (SX-Suite)
· On-site labor included (1 day)

BNO Start Extend +2/+4
· for 2/4 maintenance visits
· Warranty extension +2/+4 years
· On-site labor included 2 x 1 day/4 x 1 day
· Contract duration limited to 3 years/5 years after installation

BNO Circle
· Wear and maintenance parts for 1 maintenance visit per year
· Calibration development/quality check 1 time per year for 2 hours
· On-site labor included (1 day)
· Total contract duration minimum 3 years, max. 10 years after installation

BUCHI ACADEMY — Increase your know-how, get the edge over your competition
Expert know-how is provided by the application & service experts in our competence centers in Flawil, our market organizations and remote in our virtual classrooms.

Our scientific support offers pre-sales feasibility studies, tailored solution offers, after sales onsite support, regular basic to advanced courses and on-demand customized training.
https://www.buchi.com/en/knowledge/courses-trainings

Broad range of solutions
From pilot to process

BUCHI NIR-Online® process analyzers are versatile in where and how they can be used. While the analyzers are 100 % designed for the process, they can also be placed directly in the QC laboratory or used at-line – along the line. The wide range of mounting accessories, including turntables, pick-up tables and flow cells, allows easy deployment wherever you need quality control.

Feasibility studies, calibration development

Upscaling: online solutions

Scenario 1: You would like to know whether and with which repeatability a product sample can be analyzed for certain parameters using NIR technology? With a feasibility study we can evaluate this with you and develop robust calibration models.

Scenario 2: You have already developed calibrations and would like to transfer the data – from a competitor's system, for instance – to our system. We transfer the existing spectra into our SX-Suite software.

Scenario 3: You have acquired calibrations from external databases and would like to integrate this data into the NIR systems. This spectra transfer to our system is also possible.

Various features allow you to scale up the project progress with the same sensor! This means you can start your NIR project in the QC laboratory, simulate a process environment with our adapter portfolio and then go online when it is the right time. The same sensor you used in your laboratory for feasibility studies can then be installed in your production environment.

We are able to support you in all of your quality control steps. The entire BUCHI portfolio provides technical solutions for your validation or the corrresponding reference methods for NIR calibrations.

Validation, at-line solution

Reference methods for NIR calibrations

The new BUCHI NIR generation ProxiMate™ is a tailor-made at-line solution to validate your product samples during the process. ProxiMate™ is a very robust NIR measuring device. The instrument can be placed where the results are needed: in the laboratory or right next to the production lines.

The Kjeldahl method
Kjeldahl is the most established reference method for protein determination in food, beverage, feed and forage.

Extraction solutions
Dedicated extraction solutions for the determination of fat, for residue and contaminant analysis in various matrices, as well as for any other solvent extraction of materials for R&D or quality control.

Core messages to our customers
BUCHI creates added value

"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.

Competent
We have the technological expertise and decades of experience needed to provide competent support and work with you to continually improve our services.

Reliable
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.

Safe
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.

Cost-effective
We strive to create a high level of economic benefit and maximum added value for you.

Global
As an international family-owned business with its own subsidiaries and qualified distributors, we have a presence wherever you are located.

Easy
We support you by providing carefully designed solutions as well as instruments and systems that are easy to operate.

Sustainable
We support environmentally friendly processes and manufacture products that have a long service life. We utilize advanced technologies to leave the smallest environmental footprint possible.

Quality in your hands