BUCHI Solutions

Natural Products

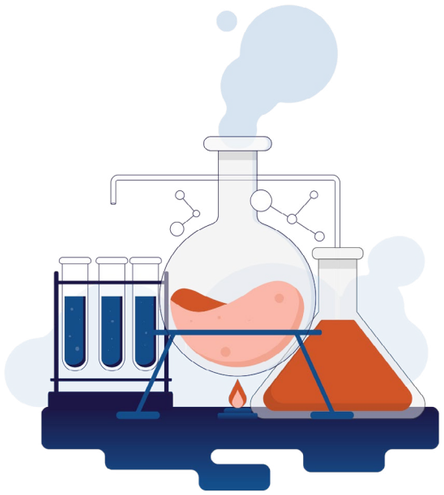
BÜCHI

Workflow
Natural Products

Natural products have served as a major source for pharmaceutical drugs since many years. Besides that, they play a key role as ingredients for food and cosmetic applications. Due to their enormous variety, the methods used for development and production of these compounds is manifold.

Discovery

The discovery of a natural product includes several steps. The process begins with production of a crude extract from a natural source, which is used for a biological screening to identify a bioactive compound. Then, any target of interest gets further processed to achieve a single compound of high purity, which is tested thoroughly for desirable characteristics and functions.



Development

Once an active ingredient has been identified, the development of the production process can begin. Here, the process is optimized on a larger scale to ensure a trouble-free production process. Before being incorporated into a final formulation, ingredients need to be preformulated in either a liquid or solid form to facilitate storage. Formulation is used to protect the target material as well as for controlled or target release.

Testing

Natural products must undergo strict application testing before they enter the production process. The final product is typically tested for chemical stability and physical integrity under specific storage, transport, and use conditions. In case of pharmaceutical application, clinical trials can take several years to complete and involve evaluating the drug mixture with animal, in vitro, and in vivo studies. If the product is proven safe and efficient, it can be released for production.

Production

Inspection of incoming goods and final quality control ensures the desired quality of any natural product. Additionally, quality control during the production helps to analyze the identity, purity, and content of bulk material, intermediates, impurities, and degradation products. Close monitoring of the process enables safe operation and ensures the product meets the required specifications.

Natural Products
R&D Discovery

	Extraction			Concentration		Separation	Drying	Analysis
	Solvent Extraction / Soxhlet			**Evaporation**		**Flash Chromatography, Prep HPLC, Prep SFC**	**Freeze Drying**	**Melting Point**
								
	UniversalExtractor E-800	SpeedExtractor E-914 / E-916	Rotavapor®	Rotavapor®	SyncorePlus	Pure & Pure Essential, Sepiatec SFC, Consumables	Lyovapor™	Melting Point
Application	Extraction is used to separate the sample matrix (plant raw material) from the desired compounds. Based on the properies of the target analyte, the solvent choice, the applied pressure, temperature and extraction parameters are essential to reach high extraction efficiency. Versatile and highly automated extraction instruments are used for the screening process for the evaluation of the raw materials. Soxhlet extraction can be performed also on a Rotavapor® when using the adapted glassware, simplifying the glassware set up and process.			Since extraction requires large amounts of solvent, a concentration step is required prior to downstream processing. Here, rotary evaporation is used to remove the solvent and concentrate the compound of interest.		The use of parallel evaporation can speed up the concentration of multiple samples. Many samples are evaporated simultaneously, which increases sample throughput.	Flash and prep HPLC (preparative high pressure liquid chromatography) & prep SFC (preparative super critical fluid chromatography) are commonly used to purify target compounds: flash is used as a pre-purification step, whereas prep HPLC and SFC increase the purity of the target compound to the maximum.	Following the separation process, molecules of interest are highly diluted and must be concentrated or dried before proceeding with the next steps. Freeze drying can be used to remove solvent from heatsensitive products with minimal damage.	Melting point analysis can be used to perform quality control on the compound of interest. Determination of the novel compound's melting point serves as a useful indicator of the material's purity.
Features	· Five different extraction methods, including true Soxhlet · Simultaneous operation of different extraction methods · Visible extraction process · Gentle drying of extract	· Extraction under elevated temperature and pressure · Very efficient extraction as the pressure breaks up the cell structure · Gentle extraction possible due to adjustment of temperature below the boiling point	· Soxhlet accessory for Soxhlet extraction · One instrument fits several application: extraction and evaporation · Extraction chamber size: 200 mL and 500 mL	· Evaporation of a single sample with volumes of 50 - 5000 mL · Fully communicating system to avoid downtime: solvent library, dynamic distillation, drying mode, leak test, foam sensor · Foam sensor accessory to automatically handle foam · Dewar accessory for freeze drying sample preparation		· Multiple samples in the range of 0.5 - 500 mL can be concentrated or dried simultaneously · Flushback Module to achieve highest analyte recovery and most reliable results · Interchangeable racks and volume versatility	· Flash instruments for basic or advanced applications · Flash and prep HPLC in one system (optionally) · Integrated UV and ELS detection (optionally) · Compact prep SFC instruments for any sample size · Compatible with a wide range of flash cartridges, prep HPLC & SFC columns and glass columns	· High-quality freeze drying of aqueous samples (-55 °C, 6 kg) · Easy way of controlling and monitoring of the freeze drying process	· Automatic determination of melting and boiling points · Compliant with Pharmacopeia methods (European, USP, Japanese) · Observation and replay of the phase transition using color display and video recording · Parallel measurement of up to 3 samples

Natural Products
R&D Development

Process

Extraction

Cold Extraction

Scaling up

Rotavapor®

Concentration

Evaporation

Scaling up

Rotavapor®

Separation

Flash Chromatography, Prep HPLC, Prep SFC

Scaling up

Pure & Pure Essential, Sepiatec SFC, Consumables

Formulation

Drying

Freeze Drying

Lyovapor™

Drying

Spray Drying

Mini Spray Dryer & Nano Spray Dryer

Encapsulation

Prilling by Vibration

Encapsulator

Application

The cold extraction performed on the laboratory evaporator can be upscaled on the industrial Rotavapor®. Here, large scale evaporating flasks and extraction chambers are used to handle large sample sizes.

The process of concentration or drying is scaled up using industrial rotary evaporation. High heating capacities and fast distillation rates can rapidly concentrate large volumes while using foam sensor for easy and unattended distillation.

As the separation process is optimized and upscaled, the sample amounts increase. With this, loading & collection equipment as well as consumables for flash chromatography and prep HPLC need to be adapted accordingly.

After separation, the molecule of interest may require concentration prior to formulation. Freeze drying is commonly used to remove the solvent without damaging the product.

Functional molecules are pre-formulated by spray drying to facilitate their storage or their incorporation into a formulation. Spray drying is one of the most common technologies used to obtain granulated substances.

Prilling by vibration (dripping) is a technique for generating small amounts of liquid carrying polymer particles in the laboratory. This process results in core shell particles or matrix particles.

Features

- Scale-up your process while keeping the same parameters and interface.
- Size of the cold extraction chamber: 200 mL and 500 mL (R-300) to 4 L (R-220 Pro)

- Evaporating flask size: from 50 mL to 50 L
- Heating capacity: from 1.3 kW up to 6.6 kW parameters stay the same
- Distillation rates:
  - Acetone: from up to 7 L / h (R-300) to up to 27 L / h (R220 Pro HP)
  - Ethanol: from up to 3 L / h (R-300) to up to 17 L / h (R-220 Pro HP)
  - Foam sensor available for laboratory and industrial evaporators

- Wide size range of consumables:
  - Flash cartridges 4 to 5000 g
  - Prep HPLC columns 4.6 to 70 mm ID
  - Glass columns 9 to 3700 g
- Several options for sample injections: solid and liquid (syringe, loop or external pump)
- Collection vessel sizes range from a few to hundreds of mL or L (funnel racks)

- Reproducible process due to stable parameters (temperature and vacuum pressure)
- Large choice of drying chambers: heatable and unheatable shelves as well as manifold cover, stoppering cover or manifold tree
- Flexible condenser capacities: L-200 ≤ 6 kg; L-300 unlimited (Infinite-Technology™)

- Generation of dry homogenous or matrix particles in a single step process
- Continuous process and short process time
- Mild drying conditions suitable for thermosensitive compounds
- Broad particle size distribution: 0.2 - 25 µm
- Suitable for applications such as drying, structural change, encapsulation or amorphous solid dispersion

- Generation of liquid core beads or capsules (wet) (possible to dry afterwards)
- Particle hardening in cooling or polymerization bath
- Extremely gentle conditions
- Narrow particle size distribution: 100 - 2000 µm

Natural Products
Production

Sample Preparation for Analysis

Extraction

UniversalExtractor E-800

SpeedExtractor E-914 / E-916

Analysis

Melting Point

Melting Point

Application

Extraction is used as sample preparation for the quality control of final phyto-pharmaceuticals. The quantification of the compound of interest and the determination of possible contaminants or undesired residues are vital to ensure the safety of the final product as well as of the raw material.

Melting point analysis can be used to perform quality control on the compound of interest. Determination of the novel compound's melting point serves as a useful indicator of the material's purity.

Features

- Fully automated solvent extraction
- Suitable for a wide range of organic solvent or water
- High sample throughput by extracting up to 6 samples in parallel

- Speed and throughput combined: able to extract 6 samples in 20 mins
- Reduced solvent consumption gives low running costs
- Complementary workflow with parallel evaporation. Compatible glassware makes extract transfer obsolete.

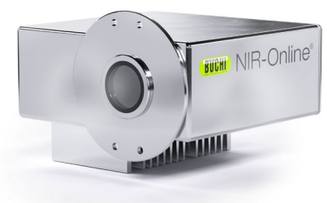
- Automatic determination of melting and boiling points
- Compliant with Pharmacopeia methods (European, USP, Japanese)
- Observation and replay of the phase transition using a color display and video recording
- Parallel measurement of up to 3 samples

Analysis

NIR Spectroscopy

ProxiMate™

NIRFlex N-500



NIR-Online Process Analyzer

Application

NIR is a fast and safe screening method that provides reliable results within (milli)seconds. The non-destructive technique is applied for raw material identification during incoming inspection as well as for quantification of multiple parameters in intermediate and final products. With NIR Atline and Online solutions, you can ensure your quality, optimize all process steps and thus improve your productivity and profitability. The laboratory device can moreover be applied to check content uniformity in tablets and capsules.

Features

- Integrated touchscreen, stand-alone
- IP69 certified, At-Line instrument
- AutoCal for calibration development without expert knowledge
- Up- and Down-View possible depending on the individual requirements
- Colour measurements according to CIE norms

- Modular design that meets individual requirements
- Compliant with 21 CFR Part 11 as well as US, EU, and Japanese pharmacopoeias regulations
- Highest spectrometer precision
- Identification of raw materials
- Quantification of raw materials, intermediates, and final products

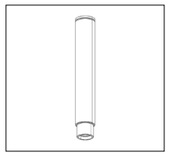
- Diode array technology for high-speed measurement of fast-moving goods
- Industry proven, robust design without moving parts copes with rough conditions e.g., vibrations, extreme temperatures, wind or humidity
- Certified for utilization in potentially explosive gas and dust atmospheres

Pressurized Solvent Extraction
Product Details

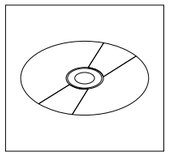
System Portfolio & Technical Features

SpeedExtractor	Number of parallel samples	Sample volume [mL]	Number of solvents	Collection vials
E-916	6	10, 20, 40	2 or 4	60 mL, 220 mL, 240 mL, SyncorePlus R-12, Waste
E-916 XL	6	60	2	60 mL, 220 mL, 240 mL, SyncorePlus R-12, Waste
E-914	4	10, 20, 40, 80, 120	2 or 4	60 mL, 220 mL, 240 mL, SyncorePlus R-12, SyncorePlus R-6, flasks for Rotavapor®, Waste

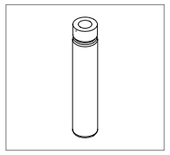
Accessories



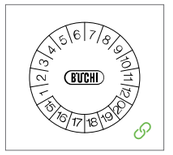
Extraction Cells
Adjust the cell size to your sample amount. Extraction cells are available for 10, 20, 40, 60, 80 and 120 mL.



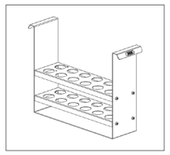
SpeedExtractor Record Software
Allows for managing and storage of methods, graphical visualization and documentation.



Collection Vessels
Full compatibility of SpeedExtractor collection glassware with SyncorePlus Analyst and Multivapor™.

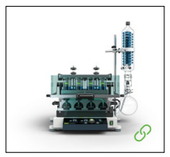


IQOQ Documentation
Installation / Operational Qualifications documentation.



Carrier for Extraction Cells
Used for sample preparation and carrying of all samples ensuring a save handling.

Automation and Workflow



SyncorePlus Analyst
Parallel evaporation for pre-analytical and fast concentration achieving high sample throughput.

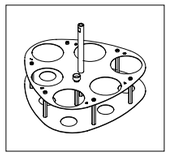
Multivapor™ P-6 / P-12
Efficient evaporation for multiple samples. With its ease of use, the Multivapor™ is tailored to maximize efficiency.

Solvent Extraction
Product Details

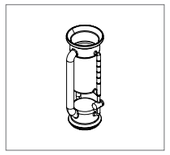
System Portfolio & Technical Features

UniversalExtractor Model	Extraction method ▶	Chamber heater	Inert gas supply	Large sample volume
E-800 Standard	Soxhlet, Continuous flow	no	no	yes (option)
E-800 Pro	Soxhlet, Soxhlet warm, Hot extraction Continuous flow, Twisselmann	yes	no	yes (option)
E-800 Pro Inert	Soxhlet, Soxhlet warm, Hot extraction Continuous flow, Twisselmann	yes	yes	yes (option)

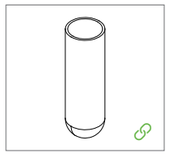
Accessories and Consumables



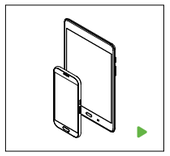
Holders and Support
Beneficial holders facilitate the easy handling of the beakers and vessels.



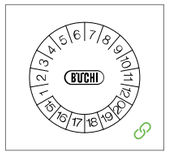
LSV Glass Parts
Expand your sample volume by using the Large Sample Volume option (LSV).



Extraction Thimbles
Best quality and optimized dimensions for sample extraction.



Extraction Reports App
Monitoring and reporting of your extraction process.

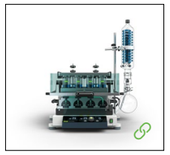


IQOQ Documentation
Installation / Operational Qualifications documentation.

Automation and Workflow

Recirculating Chiller F-305, F-308, F-314
Convenient central temperature setting, energy-saving ECOmode, and automatic start / stop.

Mixer B-400
Optimized sample preparation, combines homogenization efficiency with simple operation.



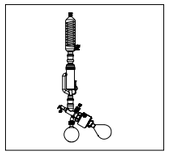
SyncorePlus Analyst
Parallel evaporation for pre-analytical and fast concentration for high sample throughput.

Laboratory Evaporation
Product Details

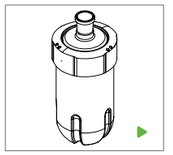
System Portfolio & Technical Features

Rotavapor® Model	Max. Flask Size	Lift System	Vacuum Pump	Chiller
R-300	1 or 5 L	electric or manual	no	no
Rotavapor® system RS-300	1 or 5 L	electric or manual	yes (final vacuum: 5 mbar)	yes (optional)
R-100	4 L	manual	no	no
Rotavapor® system RS-100	4 L	manual	yes (final vacuum: 10 mbar)	yes (optional)

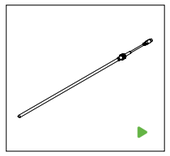
Accessories



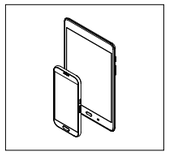
Extraction glassware
To perform Soxhlet extraction on the Rotavapor. Available extraction chambers: 200 and 500 mL.



Beaker Flasks
Beaker flasks with large screw-cap opening for easy retrieval of substances.



Foam Sensor
Prevents sample from foaming into the condenser by automatic short aeration of the system.



Monitor App
Allows to monitor all BUCHI instruments on a mobile device thanks to the BUCHI Bluetooth Dongle.

Related Instruments

Vacuum pumps V-300, V-600
Chemically resistant diaphragm pump. Final vacuum: V-300: 5 mbar / V-600: 1.5 mbar.

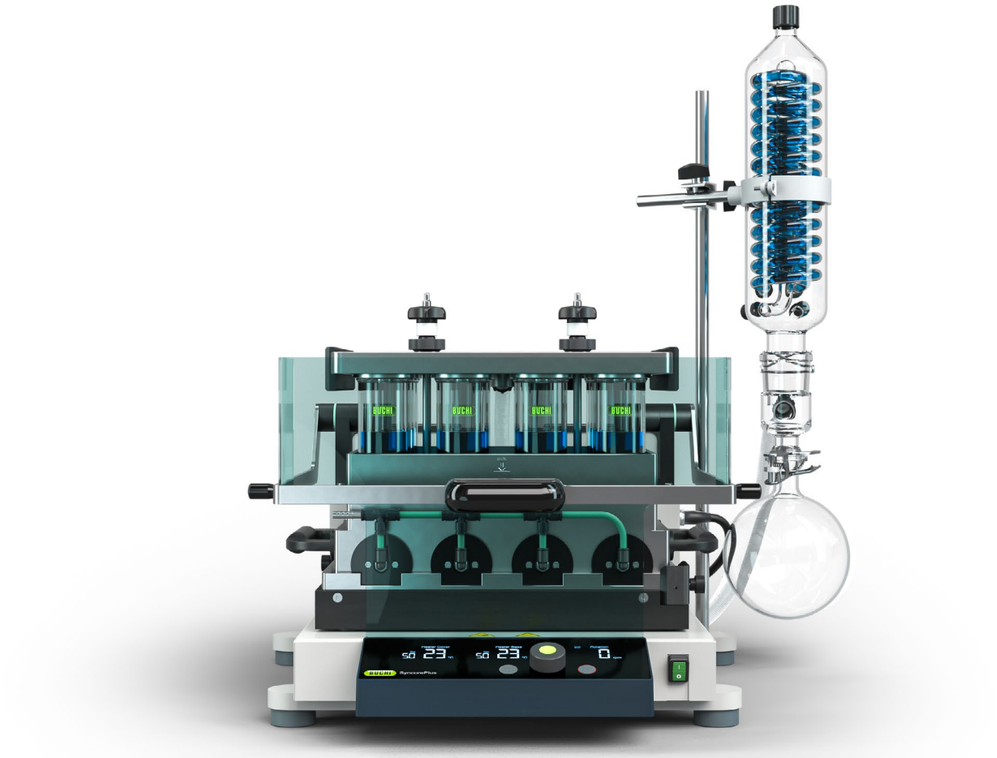
Recirculating Chiller F-305, F-308, F-314
Convenient central temperature setting, energy-saving ECOmode, and automatic start / stop.

Condensers

A	C	V	S	CR	E	BY	HP
Diagonal	Cold trap	Vertical	Reflux	Cold trap reflux	Expansion	Double jacket	High performance
•	• •	• •	•	• •	•	•	• •

- • Reduced height
- • Low boiling point
- • Standard
- • Foaming products
- • Reflux reactions
- • Increased distillation rate

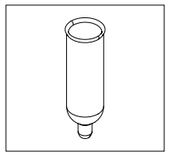
Parallel Evaporation
Product Details



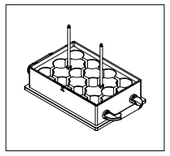
System Portfolio & Technical Features

SyncorePlus Model	Method	Number of Samples	Max Temperature	Rotation
Analyst	concentration to final volume	4, 6, 12	100 °C	60 – 400 rpm
Polyvap	evaporation to dryness	4, 6, 12, 24, 48, 96	100 °C	60 – 400 rpm

Accessories

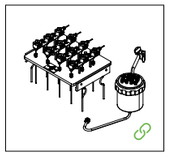


Graduated Vessels
Concentrates of up to 12 samples to a predefined residual volume using SyncorePlus Analyst, ranging from 0.3 mL, 1 mL, to 3 mL per sample.

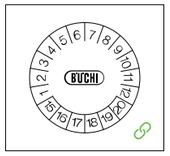


Interchangeable Racks
Broad selection of racks for SyncorePlus Polyvap to accommodate any workflow or throughput; that come in 4, 6, 12, 24, 48 and 96 positions.

Flushback Module for R-6, R-12
Improves recovery rates by flushing back analyte that adheres to the glass walls with condensed vapor during the evaporation process.



Solid Phase Extraction Cover
All essential work-up steps including evaporation of the eluates are achieved without any sample handling between the individual steps.



IQOQ Documentation
Installation / Operational Qualifications documentation.

Automation & Workflow

Interface I-300 Pro
Full automation with the Interface I-300 Pro. Start the process and walk away. Specified evaporation methods and predefined specific solvents.

Vacuum Pump V-300
Essential system component for quiet, eco-friendly operations and the ability to distill solvents of any volume and with any boiling point.

Recirculating Chiller F-305, F-308, F-314
Convenient central temperature setting, energy-saving ECOmode, and automatic start / stop.

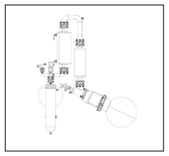
SpeedExtractor E-914 / E-916
Pressurized Solvent Extraction (PSE) for increased productivity by processing up to 6 samples in parallel. Streamlined workflow of the sample preparation thanks to ease of sample loading and ready to use extract collection.

Industrial Evaporation
Product Details

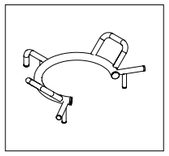
System Portfolio & Technical Features

Rotavapor® Model	Sample Size (per batch)	Heating Bath Temperature	Distillation Rate of Ethanol	EX Protection
R-220 Pro	max 12 L	up to 180 °C	up to 18 L / h	no
R-250 Pro	max 30 L	up to 180 °C	up to 19 L / h	no
R-220 EX	max 12 L	up to 150 °C (T3)	up to 12 L / h	yes
R-250 EX	max 30 L	up to 150 °C (T3)	up to 19 L / h	yes

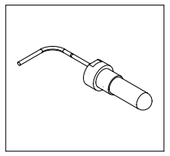
Accessories



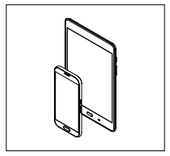
Extraction glassware
To perform cold extraction on the Rotavapor R-220 Pro. Available extraction chamber: 4 L.



Manual Flask Handler
For easy mounting and removal of the 20 L and 50 L flasks along with safe transport.



Foam Sensor
Detects rising foam and triggers a short aeration pulse, eliminating foam.



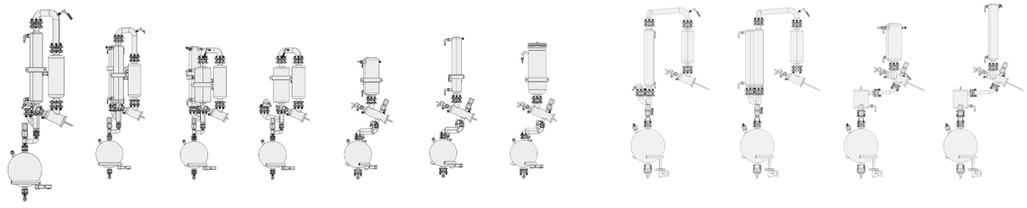
Monitor App
Allows to monitor all BUCHI instruments on a mobile device thanks to the BUCHI Bluetooth Dongle.

Related Instruments

Vacuum Pump V-600
Chemically resistant 3-stage diaphragm pump.
Final vacuum: 1.5 mbar

Recirculating Chiller F-325
Chiller that also operates as a trolley and host of the Vacuum Pump V-600 for the R-220 Pro.

Condensers



	R-220 Pro							R-250 Pro			
	D	D2	DB2	DB	RB	R	C	D2	D3	RB2	R2
	•	• •	• • •	• •	• • •	• •	• •	•	• •	• • •	• •
Height	175 cm	175 cm	150 cm	150 cm	143 cm	163 cm	158 cm	230 cm	230 cm	210 cm	226 cm

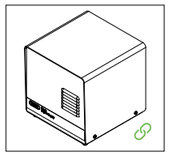
- • Low boiling points and / or foaming products
- • High boiling points
- • Very low boiling point
- • Minimum emissions
- • Reflux reactions
- • Reduced height

Flash Chromatography / Prep HPLC
Product Details

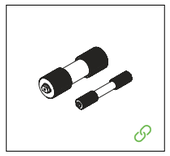
System Portfolio & Technical Features

	Pure C-805 Flash	Pure C-810 Flash	Pure C-815 Flash	Pure C-830 Prep	Pure C-835 Prep	Pure C-850 FlashPrep
Mode	Flash	Flash	Flash	prep HPLC	prep HPLC	Flash & prep HPLC
Flow Rate (flash mode)	250 mL / min	250 mL / min	250 mL / min			250 mL / min
Flow Rate (prep HPLC mode)				100 mL / min	100 mL / min	100 mL / min
Max Pressure (flash mode)	50 bar	50 bar	50 bar			50 bar
Max Pressure (prep HPLC mode)				300 bar	300 bar	300 bar
UV Scan Function	no	yes	yes	yes	yes	yes
UV-Vis Wavelengths Range	200 – 400 nm	200 – 800 nm	200 – 800 nm	200 – 800 nm	200 – 800 nm	200 – 800 nm
ELSD	no	no	yes	no	yes	yes

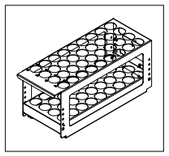
Accessories



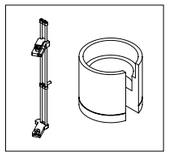
Dry Air Supply
Production of particle-free dry air on demand without the need for operator attention. Air is used in the Pure system to carry sample to the ELSD and to purge cartridges and sample loaders.



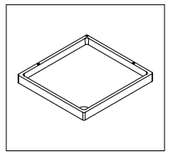
Solid Loader
Easy and flexible filling of the sample (max. 40 g) in an empty tube and connection directly to the Pure system. This equipment can handle up to 50 bar (725 psi) and therefore provides maximum flexibility.



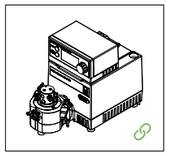
Racks
Several different sizes of racks and glass tubes, which enable an optimal collection depending on the fractions sizes. All racks get automatically identified by the Pure system via an RFID tag.



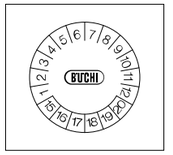
XL Consumable Holders
Allows the connection of big size cartridges (750 – 5000 g) and prep HPLC columns (50 – 70 mm ID) with Pure.



Solvent Platform
Extra solvent platform on top of the Pure system which provides space for four bottles. This allows for better use of available space and reduces risk of spills.



Sampling Pump
For large sample volumes injected manually on a large flash cartridge. Flow rates up to 250 mL / min and 50 bar.



IQOQ Documentation
Installation / Operational Qualifications documentation.

Consumables

FlashPure
A wide range of flash cartridges

Phases	Silica, C18, Amino, Diol, C18 WP, Alumina
Particle sizes	15 – 50 µm
Particle shapes	Irregular, spherical
Cartridge sizes	4 – 5000 g

PrepPure
Highest performance for prep HPLC applications

Phases	Silica, C18, C18WP, C4WP, C18AQ, Diol, PEI, 2-EP, Chiral phases
Particle sizes	5 – 15 µm
Particle shapes	Spherical
Column sizes	4.6 – 70 mm ID, 150 & 250 mm Lengths

GlasPure
Scale-up purification

Lengths	100 – 900 mm
IDs	15 – 100 mm
Silica capacities	9 – 3400 g

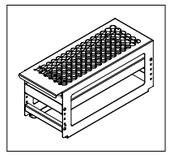
Flash Chromatography (basic & modular)
Product Details

System Portfolio & Technical Features

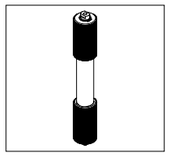
	Pure Chromatography C-900	Pure Chromatography C-900 + Fraction Collector	Pure Chromatography C-900 + UV Detector	Pure Essential Chromatography System
Modules	· 3 piston flash pump with binary gradient and a controller with novel and state-of-the-art software	· 3 piston flash pump with binary gradient and a controller with novel and state-of-the-art software · Enclosed fraction collector with active ventilation	· 3 piston flash pump with binary gradient and a controller with novel and state-of-the-art software · Highly sensitive 4 times fixed wavelengths UV detector	· 3 piston flash pump with binary gradient and a controller with novel and state-of-the-art software · Enclosed fraction collector with active ventilation · Highly sensitive 4 times fixed wavelengths UV detector

	Pure Essential Chromatography System
Mode	Flash
Flow rate	300 ml / min
Max pressure	50 bar
UV wavelengths	4
UV spectra	254, 275, 325, 365 nm

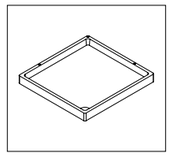
Accessories



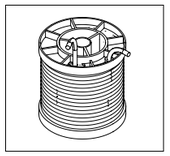
Racks
The Pure fraction collector can be equipped with two racks and is compatible with several different-sized glass tubes, funnels, and flasks, enabling an optimal collection depending on the fraction size.



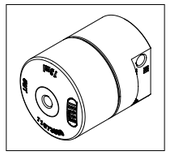
Solid loader hardware
The Pure Solid Loader allows for easy and flexible filling of the sample in an empty tube and connection directly to the Pure Essential Chromatography system. This equipment can handle up to 50 bar (725 psi), providing maximum flexibility.



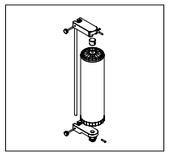
Solvent platform
The Pure fraction collector can be equipped with an extra solvent platform on top which provides space for four bottles. This allows for better use of available space and reduces risk of spills.



Loops and chambers
A liquid sample can be injected manually on the flash cartridge or loaded into a loop or a chamber, depending on the sample size.



Mixing chambers
The Pure high-pressure mixing chambers ensure proper mixing of the solvents, especially when using low concentrations.



Cartridge holder
The Pure Essential Chromatography system can handle different flash cartridges (sizes vary between 4 and 5000 g) or glass columns (ID up to 100 mm and lengths up to 900 mm) depending on the quantity of sample purified.

IQOQ Documentation
Installation / Operational Qualifications documentation.

Consumables

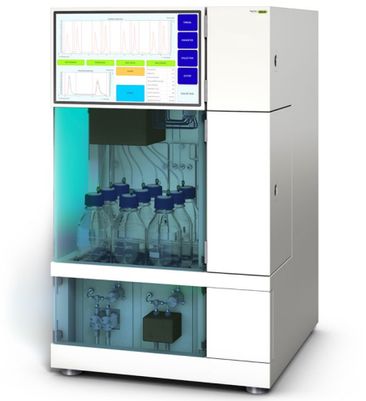
FlashPure
A wide range of flash cartridges

Phases	Silica, C18, Amino, Diol
Particle sizes	20 – 50 µm
Particle shapes	Irregular, spherical
Cartridge sizes	4 – 5000 g

GlasPure
Scale-up purification

Lengths	100 – 900 mm
IDs	15 – 100 mm
Silica capacities	9 – 3400 g

Prep SFC
Product Details



System Portfolio & Technical Features

	Sepiatec SFC-50	Sepiatec SFC-250	Sepiatec SFC-660
Mode	prep SFC	prep SFC	prep SFC
Columns			
Dimensions	4 – 16 mm ID, max 250 mm lengths	15 – 30 mm ID, max 250 mm lengths	30 – 50 mm ID, max 800 mm lengths
Pumps			
CO_2 pump flow rate and pressure	Max 30 mL / min, 400 bar	Max 150 mL / min, 400 bar	Max 400 mL / min, 400 bar
Max operating pressure	400 bar	400 bar	400 bar
Total flow rate At 40 % modifier	50 mL / min	250 mL / min	660 mL / min
Detectors			
DAD wavelengths range	190 – 720 nm	190 – 720 nm	190 – 720 nm
DAD wavelengths selectable	8	8	8
Sample injection			
Syringe	1 mL Other volumes on request	5 mL Other volumes on request	25 mL Other volumes on request
Loop	0.5 mL	2.5 mL	10 mL
Stack injection	Standard	Standard	Standard
System controller	Integrated Windows 10	Integrated Windows 10	Integrated Windows 10
Back pressure regulator	80 – 250 bar	80 – 250 bar	80 – 250 bar

Accessories

Add-on pump
The add-on pump is useful for separations at modifier concentrations below 10 %. The pump adds modifier to the separated sample and avoids precipitation of the sample in the gas-liquid separator.

Chiller
The chiller cools the pump heads of the CO_2 pump and is connected simultaneously to the pre-cooling and the CO_2 pump. The cooling is needed to keep the CO_2 in a liquid state.

Mass spectrometer (MS)
All Sepiatec SFC instruments can be connected with an external MS detector. Further info are given on request.

Evaporative light scattering detector (ELSD)
All Sepiatec SFC instruments can be connected with an external ELS detector. Further info are given on request.

Consumables

PrepPure
Highest performance for prep HPLC & SFC applications

Phases	Silica, C18, C18WP, C18AQ, C4WP, Diol, 2-EP, PEI, Chiral phases
Particle sizes	5 – 15 µm
Particle shapes	Spherical
Column sizes	4.6 – 70 mm ID, 150 & 250 mm Lengths

Chiral phases

Phase
Immobilized polysaccharides
iADMPC (Amylose tris-(3,5-dimethylphenylcarbamate))
iCDMPC (Cellulose tris-(3,5-dimethylphenylcarbamate))
iCDCPC (Cellulose tris-(3,5-dichlorophenylcarbamate))
Coated polysaccharides
cCDMPC (Cellulose tris-(3,5-dimethylphenylcarbamate))
cADMPC (Amylose tris-(3,5-dimethylphenylcarbamate))
Brush type
iBT (immobilized brush-type phase)

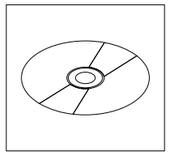
Freeze Drying
Product Details

System Portfolio & Technical Features

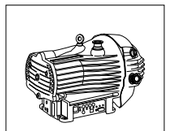
Lyovapor Model	Condenser Capacity	Lowest Condenser Temperature	Condensing Capacity	Min. System Vacuum	Drying Shelf Temperature
L-200	6 kg	-55 °C + / -3 °C	6 kg / 24 h	30 mTorr / 0.04 mbar	Up to 60 °C + / -1 °C
L-250	5 kg	-85 °C + / - 2 °C	4 kg / 24 h	30 mTorr / 0.04 mbar	Up to 60 °C + / -1 °C
L-300	Infinite	-105 °C + / -3 °C	12 kg / 24 h	30 mTorr / 0.04 mbar	Up to 60 °C + / -1 °C

Accessories

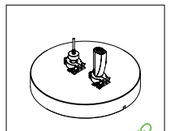
Glassware
Large variety of glassware such as beaker flasks to meet laboratory needs.



Lyovapor Software
Easy way of controlling and monitoring the Freeze Drying process and generating reports.



Edwards Scroll Pump
Stable and high-quality vacuum pump for freeze drying of organic solvents.

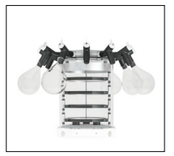


Sensors
Choice of product temperature and vacuum sensors for end point determination.

Drying Chambers

The Lyovapor™ has a large choice of drying chambers that can be used in any combination.

Acrylic chamber with heated shelves and stoppering for vial drying.



Acrylic chamber with 12 manifold top and shelves for bulk, vial and flask drying.

Acrylic chamber with heated shelves for bulk and vial drying.

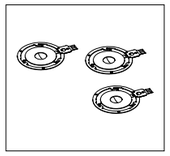
Manifold with 12, 24 or 36 valves for flask or beaker drying.

Spray Drying
Product Details

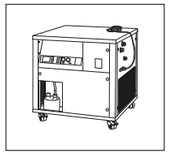
System Portfolio & Technical Features

	Nano Spray Dryer B-90 HP	Mini Spray Dryer S-300
Particle Size	200 nm – 5 um	2 – 25 um (60 um with ultrasonic package)
Particle Nature	dry	dry
Particle Size Distribution	narrow	broad
Max. Sample Throughput	200 mL / h	1 L / h
Min. Sample Amount	200 mg / 2 mL	5 g / 10 mL
Yield	up to 90 %	up to 70 %
Sample Viscosity	up to 5 cps	up to 300 cps
Sample Composition	aqueous and organic solutions, suspensions or emulsions NO acidic or alkaline	aqueous, organic, acidic and alkaline solutions, suspensions or emulsions NO acidic or alkaline organic mixture
Application	drying micronisation, agglomeration matrix encapsulation amorphous solid dispersion	

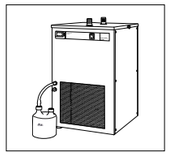
Accessories Nano Spray Dryer B-90 HP



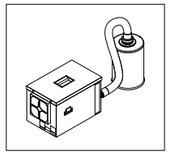
Nebulizers Set
Nebulizers in the sizes small, medium and large allow the finding of the perfect balance between small particles and high throughput (up to 200 mL / h).



Inert Loop S-395
Used to work in closed mode, under nitrogen atmosphere with the BUCHI Spray Dryers. Furthermore it condenses the organic solvents and recirculates the nitrogen.

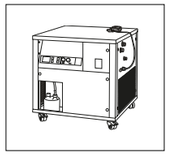


Dehumidifier S-396
An efficient way to obtain constant parameters by conditioning the inlet air allowing to work with organic solvents and water mixtures in combination with the Inert Loop.

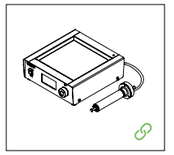


Aspirator
If no compressed air is available, the BUCHI Aspirator unit with inlet filter can be used to establish the re-quired drying air flow rate. In “closed loop” mode, with the Nano Spray Dryer advanced, the Aspirator is required to build up the gas stream.

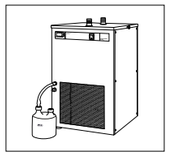
Accessories Mini Spray Dryer S-300



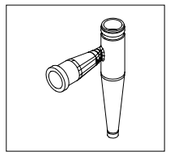
Inert Loop S-395
Used to work in closed mode, under nitrogen atmosphere with the BUCHI Spray Dryers. Furthermore it condenses the organic solvents and recirculates the nitrogen.



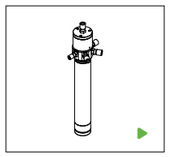
Ultrasonic Package
Allows the Mini Spray Dryer to produce particles in the size range from 10 – 60 µm.



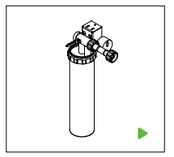
Dehumidifier
An efficient way to obtain constant parameters by conditioning the inlet air allowing you to work with organic solvents and water mixtures in combination with the Inert Loop.



High Performance Cyclone
Specially optimized to collect small particles in high yields from the Mini Spray Dryer.



Two-fluid Nozzle
The two fluid nozzle equiped with an effective nozzle cleaning mechanism and a ruby stone to guarantee reproducibility offers a high degree of flexibility.



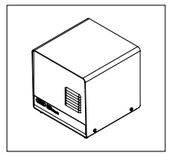
Outlet Filter
Collects the residual particles from the cyclone and protects the user, the environment and the instrument. Available with a polyester deep filter and a PTFE filter membrane. Rec-ommended for all Mini Spray Dryers.

Prilling by Vibration
Product Details

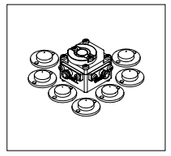
System Portfolio & Technical Features

	Encapsulator B-390 / 395 Pro
Particle Size	150 - 2000 um
Particle Nature	wet (hydrogel beads / capsules)
Particle Size Distribution	uniform
Max. Sample Throughput	600 mL / h
Min. Sample Amount	5 mL
Yield	up to 100 %
Sample Viscosity	up to 300 cps
Sample Composition	aqueous organic solutions, suspensions or emulsions wax / melt
Application	agglomeration matrix encapsulation liquid core encapsulation

Accessories



Dry Air Supply Cpl.
Brings dry and clean air to work with pressure bottle on the Encapsulator.



Concentric Nozzle
Used for the core-shell capsule production. Includes a pulsation chamber plus a set of 7 external nozzles with high precision opening of 0.2, 0.3, 0.4, 0.5, 0.6, 0.7 and 0.9 mm.

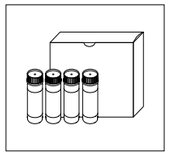
Alginate Powder
The alginate is tested for microencapsulation procedures and will make your lab work more reproducible.

Melting Point
Product Details

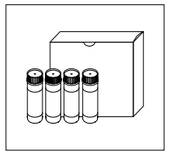
System Portfolio & Technical Features

Melting Point Model	Compliant with Pharmacopeia Methods	Automatic Detection	Sample Loader
M-560	yes	no	no
M-565	yes	yes	no
M-565 + Sample Loader M-569	yes	yes	yes

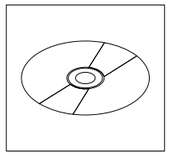
Accessories



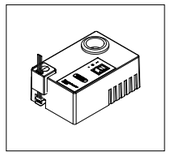
Verification Kit
Kit of three BUCHI certified standards for verification of the Melting Point M-560 and M-565.



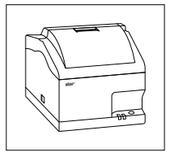
Calibration Kit
Kit of four BUCHI certified standards for calibration of the Melting Point M-560 and M-565.



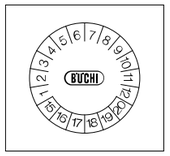
MeltingPoint Monitor Software with License
Software CD, Tutorial and single PC license. For installation under Windows 7 Professional / Enterprise / Ultimate (32-bit or 64-bit, SP1), Windows 8.1 Professional / Enterprise (64-bit), Windows 10 Professional / Enterprise (64-bit).



Sample Loader
Instrument for fast and efficient loading of samples into melting point capillaries.

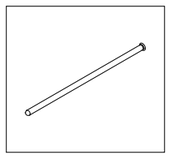


Printer and Keyboard
For documenting calibration results and melting and boiling point determinations and convenient straightforward input of parameters.

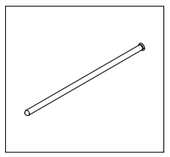


IQOQ Documentation
Installation / Operational Qualifications documentation.

Consumables



Melting Point Capillaries
The precision glass capillaries ensure highly reproducible melting point determinations.



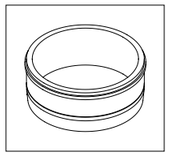
Boiling Point Tube A Boiling Point Capillary B
The precision capillaries B generate perfect gas bubbles within tube A for reproducible boiling point determinations.

NIR Spectroscopy
Product Details - ProxiMate™

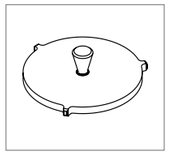
System Portfolio & Technical Features

ProxiMate™ Mode	Sample Types	Measurement Modes	Sample Cups	Optional Vis Detector
Up-View	Powders, granulates, liquids, gels	Reflexion, Transflectance	Glass petri dish, High Performance Sample Cup, Robust Cup	Yes
Down-View	Powders, granulates, very viscous and non-translucent gels	Reflexion	PS petri dish, large sample cup	Yes
Dual-View	Powders, granulates, liquids, gels	Reflexion, Transflectance	All sample cups	Yes

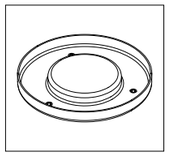
Accessories



Sample Cups
Glass petri dish, High Performance Sample Cup with certified glass bottom, Robust Cup with hardened glass bottom and silicone ring.

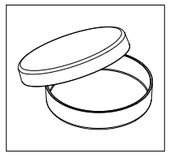


Transflectance Cover
For the measurement of liquid samples in Up-View mode.



Large Sample Cup
For the analyses of inhomogeneous samples in Down-View Mode.

Consumables



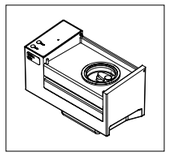
PS Petri Dish
For the analyses of samples in Down-View mode.

NIR Spectroscopy
Product Details - NIRFlex N-500

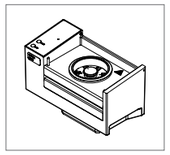
System Portfolio & Technical Features

NIRFlex N-500Measurement Cell	Sample Types	Measurement Mode
Solids	Powders, granulates, liquids, gels	Reflexion, Transflectance
Liquids	Liquids	Transmission
Fibre Optics Solids/Liquids	Powders, granulates, liquids, gels	Reflexion (only Fibre Optics Solids), Transflectance
Solids Transmittance	Tablets and capsules	Transmission

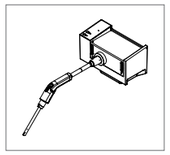
Measurement Cells



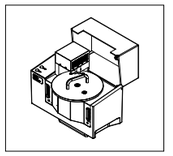
Solids
Different add-ons for different sample scenarios are available, see below.



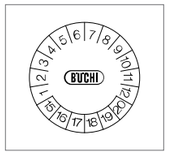
Liquids
For the temperature-controlled measurement of liquids in cuvettes or disposable vials.



Fibre Optics Solids
For the direct NIR measurement of raw materials in containers

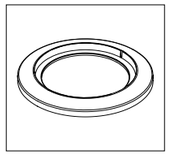


Solids Transmittance
For the measurement of content uniformity in transmission of whole tablets and capsules.

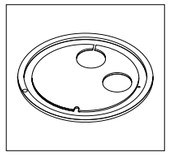


IQ/ OQ Documentation
Installation / Operational Qualifications documentation.

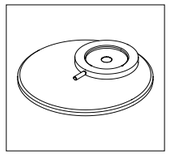
Add-Ons for Solids Cell



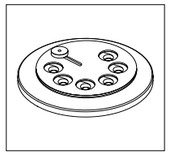
Petri Dish Add-On
To be used with glass petri dish, PS petri dish, the High Performance Sample Cup, or the Robust Cup (see page 31).



XL Add-On
For the measurements of samples in bags.

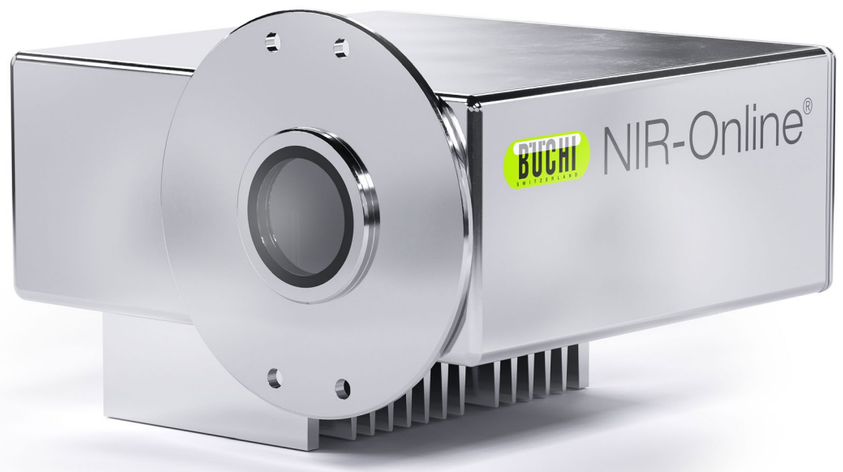


XL Add-On With Iris Aperture
For sample cups smaller than petri dish.



Vial Add-On
For the consecutive measurement of 6 vials.

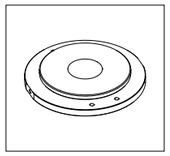
NIR Spectroscopy
Product Details - NIR-Online Process Analyzer



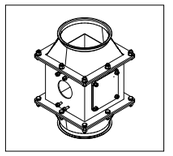
System Portfolio & Technical Features

	X-One	X-Sential™	Multipoint System	PA2
Sample Type	Solids, liquids, viscous, pasty	Solids, liquids, viscous, pasty	Solids, liquids, viscous, pasty	Solids, liquids, viscous, pasty
ATEX Certification	Dust- & Gas-Ex	General purpose, only	Dust-Ex	Dust- & Gas-Ex
When to use	· for demanding process applications · for fast moving goods e.g., conveyor belt installations · for NIR or VIS measurements · for visible detections of e.g., foreign particles	· for monitoring basic parameters such as moisture, fat, or protein · developed and designed as the most cost-efficient choice	for covering the production with up to 10 measurement points with only one spectrometer	for demanding process applica-tions requesting an extended spec-trometer range

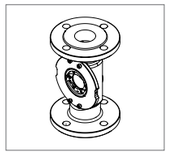
Measurement Cells



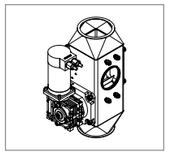
Weld-In Flange
For direct mount to the production line. No physical contact of the sensor with the product.



X-Square
For all kind of solids and powders. Designed for continuous product flows.

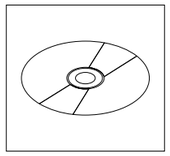


X-Cell DN50, PL1, 10bar
For liquid and paste-like products.

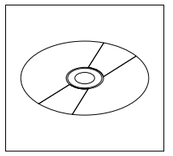


XL-Feeder
For all kind of solids and powders. Designed for discontinuous product flows.

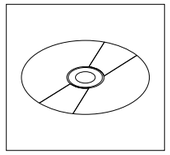
Software



SX-Suite
Intuitive user interface provides the interpretation of the instrument data and structures it to monitor, control and document the process.



AutoCal
AutoCal is the most convenient tool available on the market to create and maintain calibrations.



SX-Plus
Toolbox to create, update and optimize calibrations.

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 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.

We are represented by more than 100 distribution partners worldwide.
Find your local representative at:

www.buchi.com

Quality in your hands
