



Sepiatec SFC Systems

The Green Standard for Fast Compound Isolation



A Green Standard for Fast Compound Isolation

Simply revolutionary

Supercritical Fluid Chromatography has been researched and applied for several decades. The technique has dramatically advanced over the last decade. This trend towards SFC came about because it opened the door to a much better world for any chemistry lab.



Greener

- CO₂ is a by-product of chemical plants and the fermentation industry
- Low organic solvent consumption, since the primary mobile phase is CO₂
- Uses less hazardous mobile phases



Faster

- Shorter run times thanks to the low viscosity of supercritical fluids
- Quicker solvent disposal and recovery
- High separation efficiency, leading to increased loading capacity and a fast injection cycle time



Cost-efficient

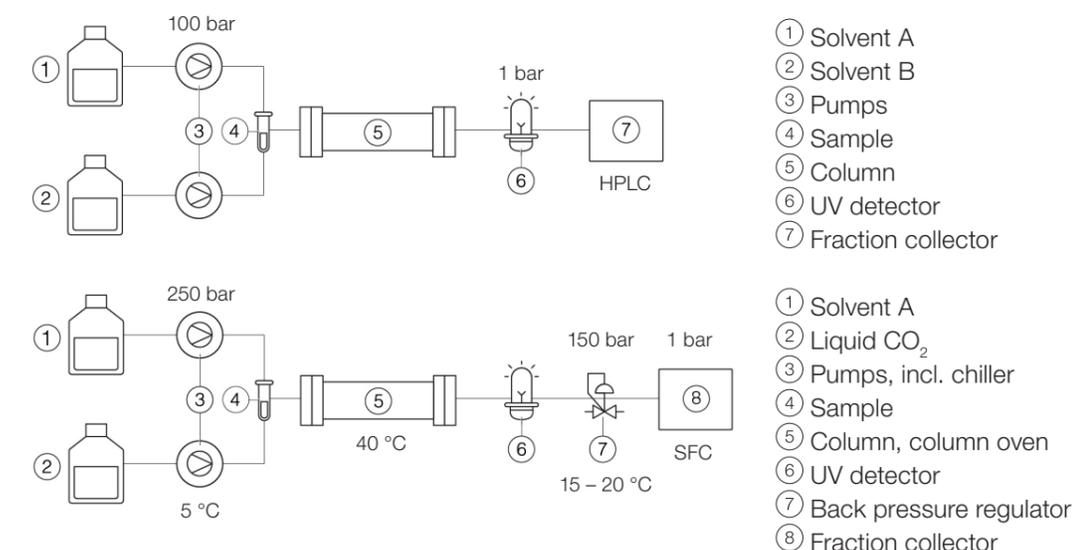
- Use of comparatively low-cost CO₂
- As CO₂ is the primary solvent, fewer organic solvents are required
- Reduced waste costs since CO₂ gets evaporated at the end of the run

What is SFC?

A novel separation technique

SFC (Supercritical Fluid Chromatography) is a separation technique similar to HPLC (high-pressure liquid chromatography) but uses supercritical fluids as a mobile phase. Therefore, to operate SFC, it is necessary to maintain temperature and pressure above the critical level of the mobile phase throughout the column.

The difference in the setup of an HPLC and SFC instrument is shown below.

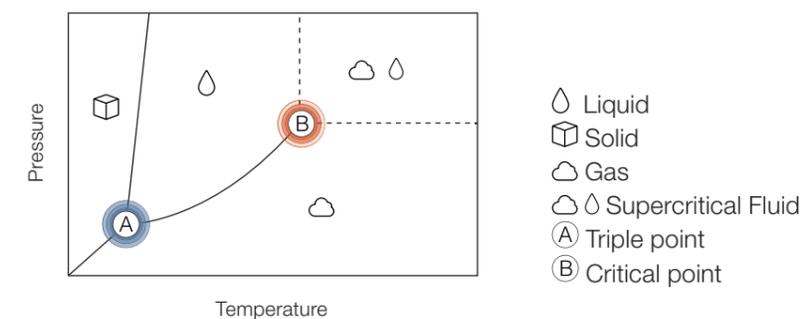


The role of CO₂

Carbon dioxide is the most commonly used supercritical fluid for several reasons. It has a low critical temperature and pressure (31 °C and 73.8 bar), is highly inert under most conditions, non-flammable and it has minimal reactivity, and high purity at a low cost. Carbon dioxide is also miscible with many high polar organic solvents, in contrast to n-hexane, which offers low polarity compared to supercritical carbon dioxide. These factors allow for SFC to achieve a wide variety of separation patterns.

What is a supercritical fluid?

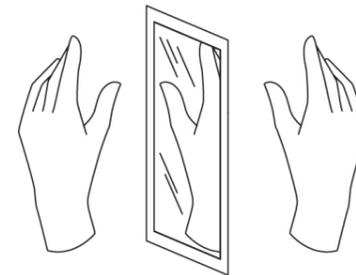
Depending on temperature and pressure conditions, substances can be in a solid, liquid, or gaseous state. If a liquid or gas is used above its critical temperature and pressure, it changes to a supercritical fluid. The characteristics of supercritical fluids are intermediate between those of gases and liquids. A supercritical fluid can be considered a dense gas.



Supercritical Fluid Chromatography

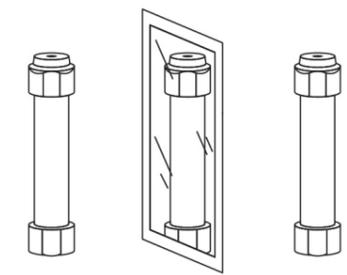
A wide application range

Traditionally, SFC was used for chiral and low-polarity compounds only. However, significant advances in instrument performance and column types that recently became possible extend the applications to achiral and more polar compounds. It is now possible for SFC to separate any compound at high purity.



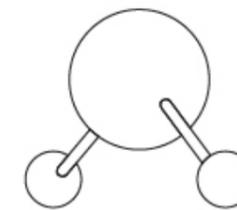
Chiral Compounds

Most small drug-like compounds have stereoisomers, and the pharmacological activities of each enantiomer are different. Due to historical reasons, SFC became the technique of choice for the separation of these enantiomers and has proven its power for many decades.



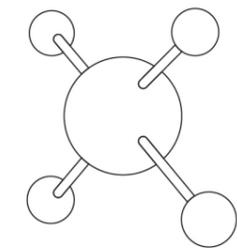
Achiral Compounds

During the last few years, SFC has been developed into a major tool in the separation of achiral compounds. Extensive research has been conducted on column selection to make SFC compatible with achiral compounds.



Polar Compounds

SFC can purify polar compounds through the use of polar modifiers; This is generally an organic solvent that is completely miscible with carbon dioxide (alcohols, cyclic ethers) but can be almost any liquid, including water. As a rule, any compound soluble in methanol, or a less polar solvent, is a good candidate for separation by SFC.



Nonpolar Compounds

In the early days of SFC, most applications involved the separation of relatively low polar compounds due to the use of pure carbon dioxide. The nonpolar character of carbon dioxide favors the solubility of hydrophobic (nonpolar) compounds in the mobile phase.

It is now possible for SFC to separate any compound at high purity. Today SFC can replace traditional chromatography for a number of applications.



Sepiatec SFC Systems

The smartest system to make separations greener

Sepiatec SFC (supercritical fluid chromatography) instruments offer chemists the numerous benefits that SFC technology provides. The process offers increased safety, faster separations, and lower costs due to the reduced consumption of organic solvents. It achieves all these benefits while being more environmentally friendly than alternative solutions. Sepiatec SFC instruments were designed for SFC applications and are extremely easy to use. They take less space than expected to satisfy any requirements, from basic to complex tasks, on a small or large scale.



Easy to handle SFC for everyone

With Sepiatec SFC instruments, BUCHI makes SFC usable for everyone. The instruments are dead easy to handle thanks to:

- SFC-dedicated software with a clear menu structure and dedicated functions such as stack injection, peak detection, and on-the-fly editing
- Automatic suggestions of stack times for stacking injection mode
- All instruments are equipped with a connection piece for an exhaust system and can be operated on a benchtop or fume hood

Space saving Smallest on the market

Space is precious in every lab. Sepiatec SFC instruments allow optimal use of space due to several beneficial features:

- A small footprint and the most compact design in all power performance classes
- An all-in-one setup including a screen, a detector, a fraction collector, pumps and column oven
- A highly service-friendly modular design that allows access to all parts from the front

Highest flexibility Suitable for any need

A chemist's needs vary depending on the application. Sepiatec SFC instruments portfolio supports flexibility in several ways:

- Various models for different performances (flow rates of pump)
- Fits column sizes from 4 – 50 mm ID and 150 – 800 mm lengths
- Choices of detection (UV, ELSD, and MS), injections (stack / multiple), and collection (sizes of vessels / tubes)



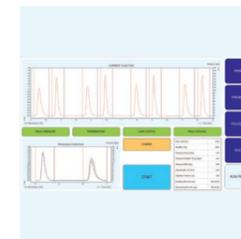
Easy to Handle SFC for everyone

With Sepiatec SFC instruments, BUCHI makes SFC usable for everyone. The instruments have been specifically designed with a focus on ease of use, thanks to several key features.



Profit from the experts

The entire Sepiatec SFC device runs dedicated software developed by SFC experts. A clear menu structure enables a simple and intuitive process with dedicated functions such as stack injection, peak detection, and on-the-fly editing for changing parameters during a run. All input options are presented on just a few screens. Data is entered via the 15.6" touch screen, which has been placed ergonomically on the upper front of all Sepiatec SFC instruments.



Large-scale injection in no time

Stacked injection mode is used when working with large sample amounts and requires an isocratic gradient mode. This technique allows for the successive injection of additional samples and utilises the time spent waiting for peak elution. The Sepiatec Prep SFC Control software automatically suggests stacking time and therefore makes the setup of a stacked injection method extraordinarily simple.



A simple but smart instrument setup

A simple setup makes becoming familiar with the instrument a breeze; therefore, time-intensive training sessions are unnecessary. Everything has been thought of, including a connection piece for an exhaust system by default. In addition, all of Sepiatec SFC instruments can be operated on a benchtop or a fume hood.



Space Saving Smallest on the market

Space is a precious commodity in every lab. Sepiatec SFC instruments are the most compact on the market, allowing for the optimal use of valuable space without compromising on quality and efficiency.



Minimal lab space

All Sepiatec SFC instruments, from small to large-scale purification, require a minimum footprint in the laboratory. The system controller and fraction collector are built into the device and need no extra space beside the instrument. Therefore, precious lab space, be it in or out of a fume hood, can be saved and used for other equipment.



Service made easy

The Sepiatec SFC instrument design stands out due to its modular design, which is highly service-friendly by allowing access to all parts from the front. Replacement of spare or wear parts is quick and easy as there is no need to move or turn the instrument.



All-in-one

Even being the smallest on the market, Sepiatec SFC instruments come with everything that's required to run supercritical fluid chromatography without compromise:

- High-pressure pump for CO₂
- High-pressure pump for modifiers
- Adjustable back pressure regulator
- Column oven
- Syringe pump for sample injection
- Gas-liquid-separators
- UV detector
- Fraction collector
- Integrated system controller, incl. the Prep SFC control software
- 15.6" touchscreen

Highest Flexibility Suitable for any need

The needs of the chemist vary depending on the application. The Sepiatec SFC comprehensive instrument portfolio supports flexibility in a number of ways.



Various models for different performance levels

Sepiatec SFC systems cover the full range of separation needs, handling sample capabilities in the milligram to gram range. Pumps with different flow rate ranges allow for HPLC columns of various sizes, accommodating internal diameters ranging from 4 – 16 mm, 15 – 30 mm, and 30 – 50 mm and lengths from 150 – 800 mm. Depending on the model, up to 10 columns can be stored in the column oven simultaneously and connected for screening if required.



Versatile options for detection and injection

Monitoring the separation of a mixture's compounds is crucial for successful purification as it ensures the proper collection of the target compound. All Sepiatec SFC instruments are equipped with a UV detector but also allow the connection of an Evaporative Light Scattering detector (ELSD) and Mass Spectrometer (MS). Sample injection can be done on the Sepiatec SFC instrument in two ways: multiple and stacked. Stacked injections are useful when injecting large sample amounts under isocratic solvent conditions, while multiple injections are done sequentially.

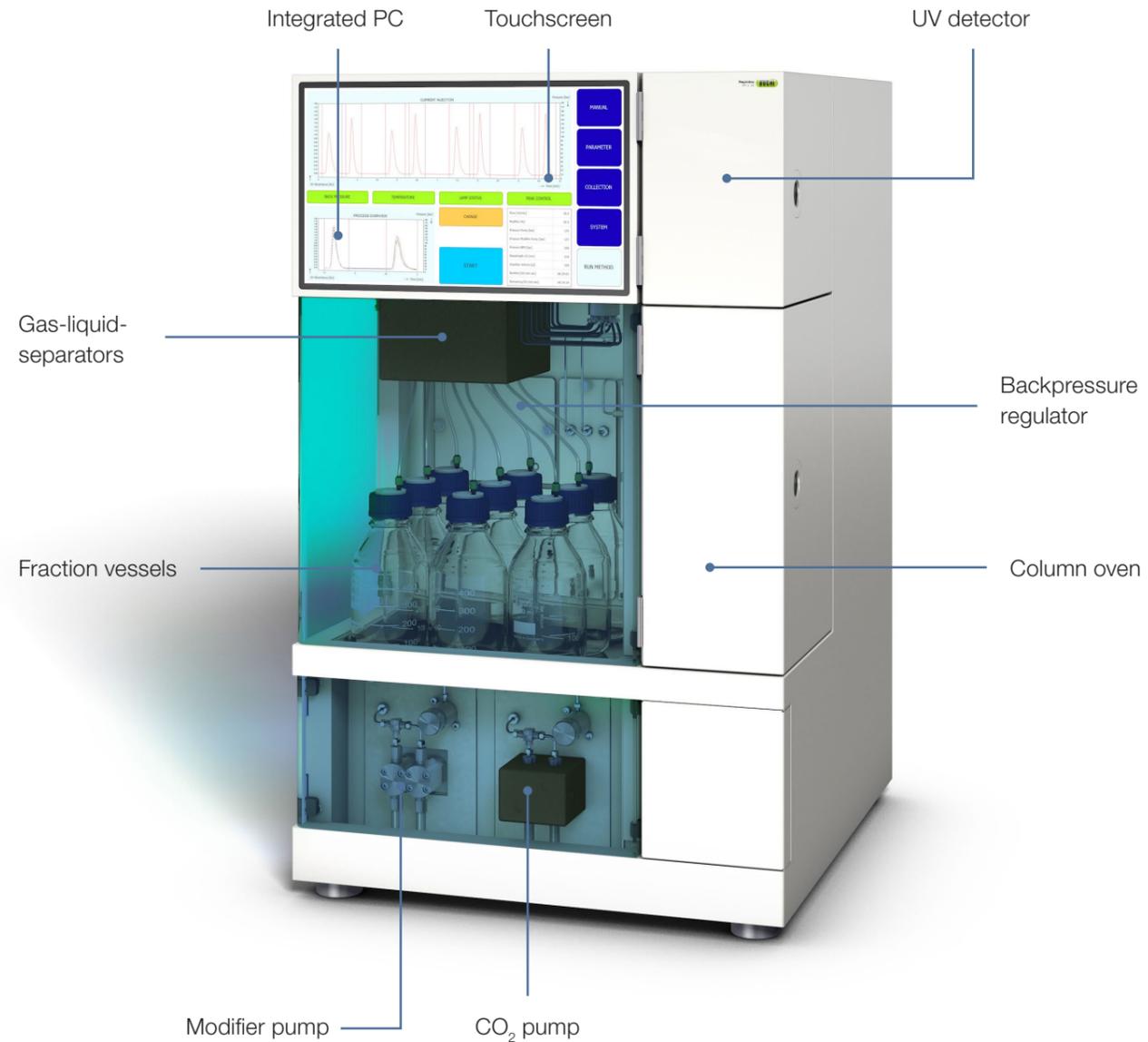


Fraction collection at any size

With Sepiatec SFC instruments, fractions are collected in an unpressurized state. Thereby, not only is safety increased but also handling is simplified. There is no limitation concerning the size of fraction volumes. This option proves to be highly convenient when working with stacked injections.

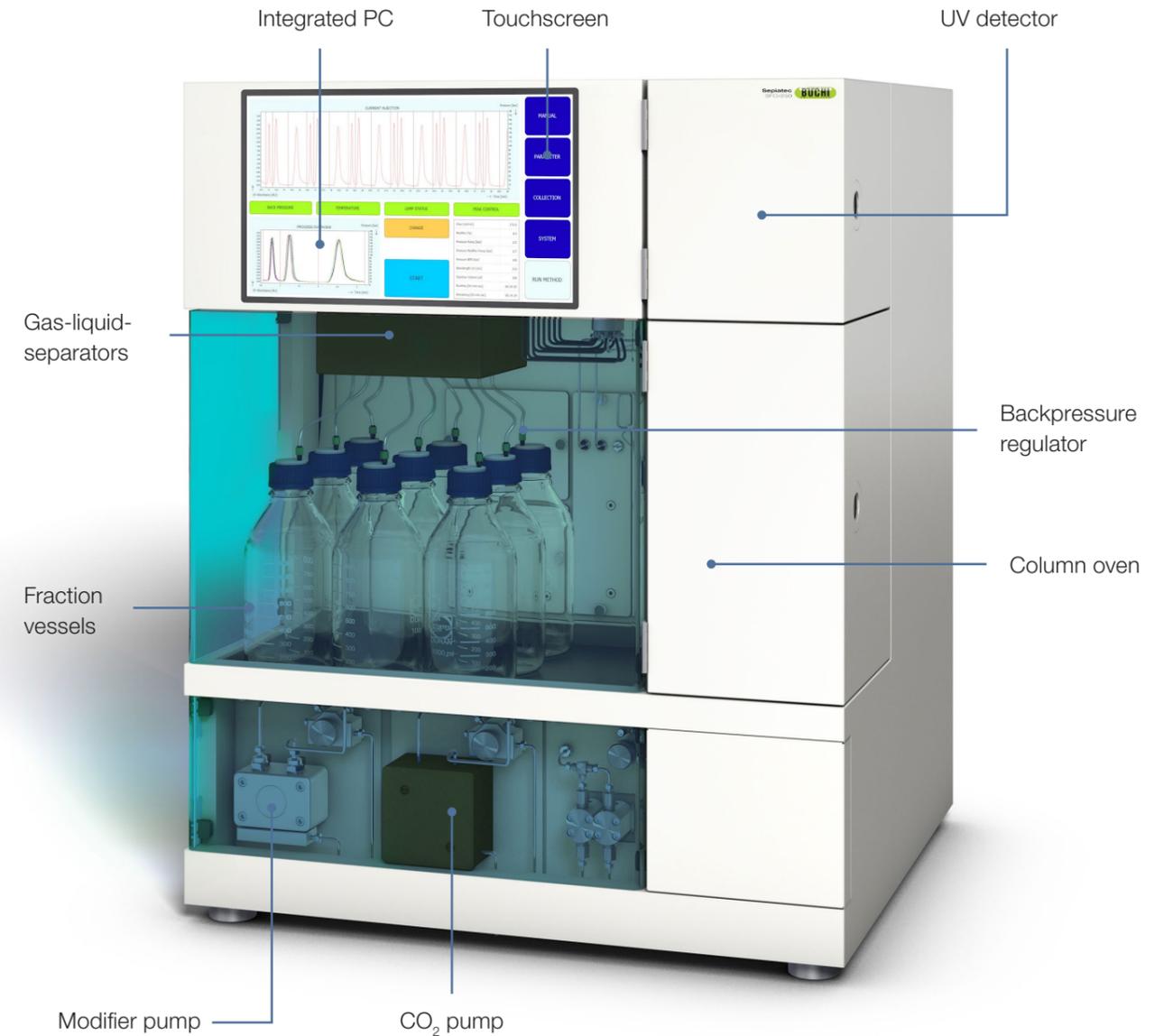
Sepiatec SFC-50

Easy start into SFC separations and method development



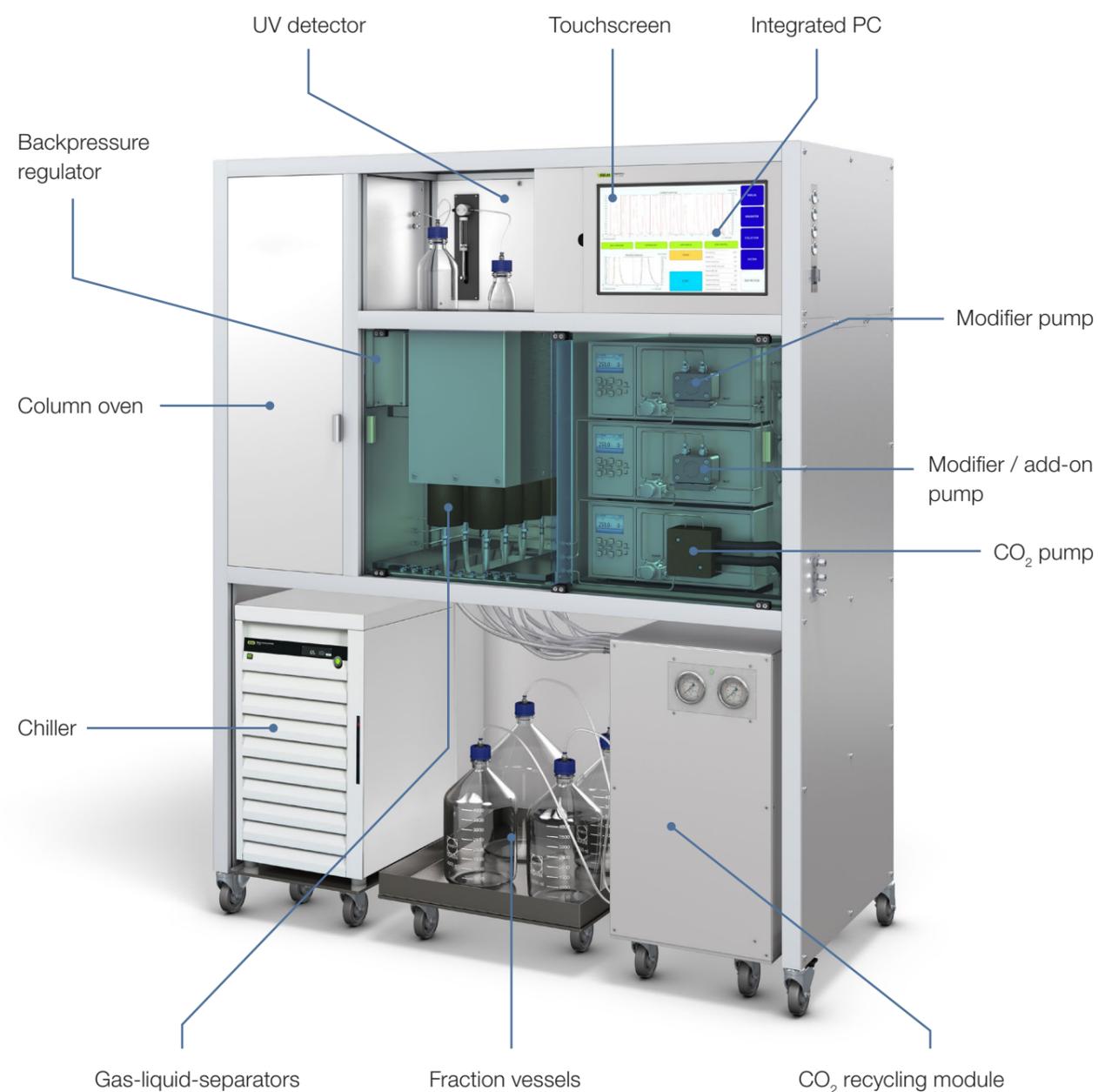
Sepiatec SFC-250

Efficient separations for a wide range of applications



Sepiatec SFC-660

Highest loading and throughput



Consumables

Highest performance for prep SFC applications

The PrepPure portfolio offers a wide range of columns for prep HPLC and prep SFC applications. It covers modified silicas, incl. coated and immobilized polysaccharides with unique selectivities for polar and unpolar and chiral and achiral compounds. For SFC, the portfolio provides the chemist with a number of options for phases and dimensions.

Phase	Remarks
Silica	Most polar phase, typically used for Normal Phase LC and achiral SFC applications
Diol	Polar phase, typically used for Normal Phase LC and achiral SFC applications
2-Ethylpyridin (2-EP)	Polar phase, typically used for achiral SFC applications
Polyethyleneimine (PEI)	Polar phase, typically used for achiral SFC applications
C18	Most unpolar phase, typically used for Reversed Phase LC applications and achiral SFC applications
C18WP	Unpolar phase with large pore diameter, typically used for Reversed Phase LC peptides/protein applications
C18AQ	Unpolar phase modified by small polar silane which makes the phase water resistant
C4WP	Unpolar phase with large pore diameter, typically used for Reversed Phase LC peptides/protein applications
CBD	Typically used for CBD SFC applications
Immobilized polysaccharides	
iADMPC (Amylose tris-(3,5-dimethylphenylcarbamate))	Typically used for chiral SFC applications
iCDMPC (Cellulose tris-(3,5-dimethylphenylcarbamate))	Typically used for chiral SFC applications
iCDCPC (Cellulose tris-(3,5-dichlorophenylcarbamate))	Typically used for chiral SFC applications
Coated polysaccharides	
cCDMPC (Cellulose tris-(3,5-dimethylphenylcarbamate))	Typically used for chiral SFC applications
cADMPC (Amylose tris-(3,5-dimethylphenylcarbamate))	Typically used for chiral SFC applications
Brush type	
iBT (immobilized brush-type phase)	Typically used for chiral SFC applications

Technical Data

Sepiatec SFC Systems

	Sepiatec SFC-50	Sepiatec SFC-250	Sepiatec SFC-660
Method			
Method development	Yes, on analytical columns (4 – 4.6 mm)	No	No
Preparative SFC	Yes	Yes	Yes
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
Column oven			
Temperature	Ambient to 70 °C	Ambient to 70 °C	Ambient to 50 °C
Standard column capacity	2	2	1
Optional column capacity	10	10	2
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
Number of modifier pumps	1	1	2
Modifier pump flow rate and pressure	Max 30 mL / min and 400 bar	Max 150 mL / min and 400 bar	1) Max 250 mL / min and 400 bar 2) Max 150 mL / min and 400 bar
Add-on pump	Optional external	Standard integrated	Standard integrated
Max operating pressure	400 bar	400 bar	400 bar
Total flow rate At 40 % modifier	50 mL / min	250 mL / min	660 mL / min
Solvents			
CO ₂	Liquid	Liquid	Liquid gaseous (with CO ₂ recycling module)
Number of organic modifier solvents	4	4	4

	Sepiatec SFC-50	Sepiatec SFC-250	Sepiatec SFC-660
Detectors			
DAD wavelengths range	190 – 720 nm	190 – 720 nm	190 – 720 nm
DAD wavelengths selectable	8	8	8
ELSD (optional)	Yes	Yes	Yes
MS (optional)	Yes	Yes	Yes
Fraction collection			
Standard	1 – 8 fractions, individual GLS	1 – 8 fractions, individual GLS	Single mode: 1 – 8 fractions, individual GLS Tandem mode: 1 – 4 fractions, individual GLS
Optional	Up to 195 fractions, autosampler, continuous GLS	Up to 195 fractions, autosampler, continuous GLS	None
Volumes	Unlimited	Unlimited	Unlimited
Pressure-less collection	Standard	Standard	Standard
CO₂ recycling module available	No	No	Yes
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
Screen	15.6" touch screen, 16:9 format	15.6" touch screen, 16:9 format	15.6" touch screen, 16:9 format
Dimensions (W x D x H)	56 x 60 x 88 cm	72 x 60 x 88 cm	150 x 68 x 178 cm



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 CO₂ pump and is connected simultaneously to the pre-cooling and the CO₂ pump. The cooling is needed to keep the CO₂ 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)

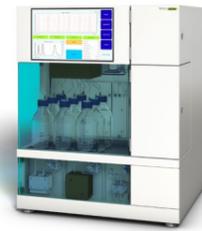
All Sepiatec SFC instruments can be connected with an external ELS detector. Further info are given on request.

The Complete Chromatography Portfolio

Overview



Sepiatec SFC-50



Sepiatec SFC-250



Sepiatec SFC-660

Description	Prep SFC instruments that differ in compatibility with different column sizes.		
Type of Chromatography			
Liquid	-	-	-
Supercritical fluid	•	•	•
Pump mode			
Flash	-	-	-
prep HPLC	-	-	-
prep SFC	•	•	•
Detector			
UV	-	-	-
DAD	•	•	•
ELSD	Optional	Optional	Optional
MS	Optional	Optional	Optional
Consumables			
Flash cartridges 4 – 5000 g	-	-	-
prep HPLC or SFC columns 4 – 16 mm ID	•	-	-
prep HPLC or SFC columns 15 – 30 mm ID	-	•	-
prep HPLC or SFC columns 30 – 50 mm ID	-	-	•
prep HPLC or SFC columns 70 mm ID	-	-	-



Pure C-805



Pure C-810



Pure C-815



Pure C-830



Pure C-835



Pure C-850

Description	Flash LC instrument portfolio with a wide range of detection solutions.			Prep HPLC instruments with different detection possibilities.		A dual instrument for flash LC and prep HPLC applications.
Type of Chromatography						
Liquid	•	•	•	•	•	•
Supercritical fluid	-	-	-	-	-	-
Pump mode						
Flash	•	•	•	-	-	•
prep HPLC	-	-	-	•	•	•
prep SFC	-	-	-	-	-	-
Detector						
UV	•	-	-	-	-	-
DAD	-	•	•	•	•	•
ELSD	-	-	•	-	•	•
MS	-	-	-	-	-	-
Consumables						
Flash cartridges 4 – 5000 g	•	•	•	-	-	•
prep HPLC or SFC columns 4 – 16 mm ID	-	-	-	•	•	•
prep HPLC or SFC columns 15 – 30 mm ID	-	-	-	•	•	•
prep HPLC or SFC columns 30 – 50 mm ID	-	-	-	•	•	•
prep HPLC or SFC columns 70 mm ID	-	-	-	•	•	•



Service and Training

BUCHI service packages

BUCHI START - The highest efficiency from the very beginning

From a professional installation to a carefree agreement that will leave you with full cost predictability and the highest possible system efficiency. www.buchi.com/start

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- Product installation and testing
- Hands-on training from a certified technician
- Evaluation of the immediate surroundings of your new product
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«IQ / OQ»

- Product or system installation
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BUCHI EXACT - Certified accuracy for highest level of confidence

Receive comprehensive qualifications with all of your BUCHI products. We perform qualification services on a level that can only be achieved by the manufacturer. www.buchi.com/exact

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- Our one-time OQ service will provide you with all the necessary documents and certificates.
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Buying an OQ package will grant you an additional discount on the documents and offer you priority service with automated visit scheduling.

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Maintaining a heavily used device requires different parts and inspection frequencies than units that are operated occasionally. Our approach takes factors like these into consideration to provide you with an optimal yet cost-efficient solution. www.buchi.com/care

BUCHI ACADEMY - Increase your know-how, get the edge over your competition

Expert know-how is provided by the application chemists in our competence centers in Flawil, Beijing and Mumbai and the locally available experts at our market organizations. 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.

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Pharma and Chemistry

R&D Discovery

Synthesis, Extraction

Concentration

Separation

Drying

Analysis

Cold Extraction / Soxhlet

Evaporation

**Flash Chromatography
Prep HPLC**

Freeze Drying

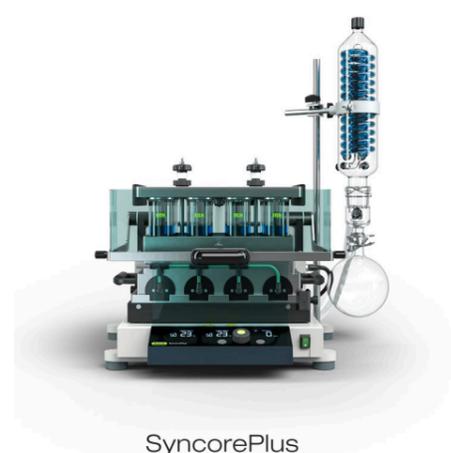
Melting Point



Rotavapor®



Rotavapor®



SyncorePlus



Pure Instruments
and Consumables



Lyovapor™



Melting Point

Application

The search for active pharmaceutical ingredients (APIs) and chemical compounds typically begins with a synthesis or an extraction step. Reflux synthesis and Soxhlet extraction can be performed via a rotary evaporator.

Since both synthesis and extraction require 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.

Features

- Reflux condenser for reflux synthesis
- Soxhlet accessory for Soxhlet extraction
- One instrument fits several application

- Evaporation of a single sample with evaporating flask size of 50 to 5000 mL
- Fully communicating system to avoid downtime: solvent library, dynamic distillation, drying mode, leak test, foam sensor
- 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 and preparative high pressure liquid chromatography (prep HPLC) are commonly used to purify target compounds: flash is used as a pre-purification step, whereas prep HPLC increases the purity of the target compound to the maximum.

Following the separation process, molecules of interest are highly diluted and must be concentrated before proceeding with the next steps. Freeze drying can be used to remove solvent from heat-sensitive 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.

- Flash and prep HPLC in one system (optionally)
- Integrated UV and ELS detection (optionally)
- Compatible with a wide range of flash cartridges, prep HPLC columns and glass columns
- Leak, pressure, solvent level sensors and RFID technology on cartridges and racks for superior sample safety

- Two BUCHI platforms available:
 - L-200: high-quality traditional freeze drying of samples (-55 °C, 6 kg)
 - L-300: continuous sublimation with two alternately working and automatically cleansed condensers at -105 °C (Infinite-Technology™)
- 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

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.
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Quality in your hands

