

Where **Engineering**
Meets **Application**

Core | **Catalogue**

2022 v1.4

SCIMED[™]
 Core Separations

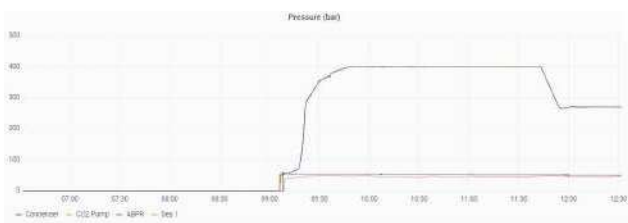
11. Core | Reaction

upto 1000 bar

Supercritical fluids (SCF) are not just good in extraction and separation processes. Their unique properties give rise to several different applications such as chemical reaction and particle size formation.

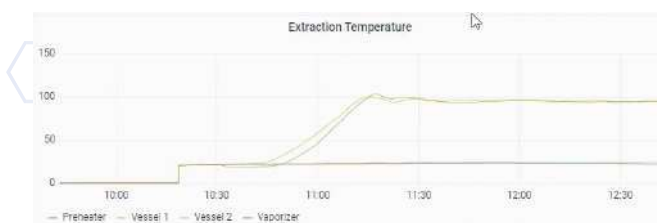
The Core | **Reaction** systems have been designed to harness the power of supercritical fluids to either explore SCF as an alternative solvent in chemical transformations or in the formation of nano and micro-sized particles to improve dissolution of active pharmaceutical ingredients (API) for example utilising either the rapid expansion of supercritical solution (RESS) techniques or supercritical anti-solvent method (SAS).

Core | Controlled Depressurisation



Depressurisation control on many other control systems simply involves the controlled opening of the BPR needle over time. The user calibrates the needle speed to achieve the necessary setpoint. The SFX software removes this trial and error and introduces true depressurisation control through a ramp rate setpoint and pressure control feedback.

Core | Temperature Ramp



Building on our pressure control, the SFX Software has a built-in temperature ramp feature, allowing the user to control the rate of heating.

Pressure, bar
upto 1000

Temperature, °C
upto 150

Volume, L
upto 10

Flow Rate, g/min
upto 1,000

Flow Meter
Optional

Applications

Hydrogenations and Hydroformylation

C-C bond Formation

Enzymatic Biotransformations

Particle Engineering

Aerogel Formation



For more information: contact@coreseparations.com

Co-solvent Pump
Optional

Automated BPR
Standard

Cyclones
200 bar Std

Control
PLC-PC

Stirrer
Optional

Multi-Vessel System

Within the reaction range both single dual vessels combinations are available. The configuration depends upon the application required. With a simple reaction or transformation using ScCO₂ fluid as the solvent only a single vessel configuration is required. However if you are looking at exploring particle size reaction using either RESS (rapid expansion of supercritical solutions) or SAS (supercritical anti-solvent then both a dissolution and spray vessel maybe required. All vessels come with the option to include a high pressure overhead stirrer.

System sizes available

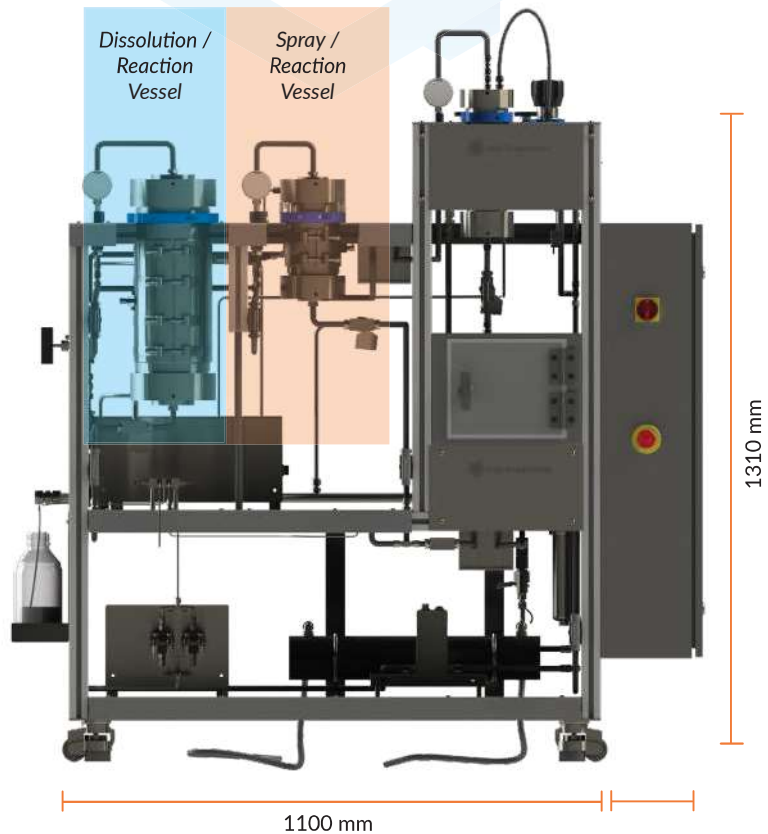
SFXR 500 | SFXR 1L | SFXR 3L | SFXR 5L | SFXR 10L

Extraction

Extractor volume upto 10L
CO₂ flowrate upto 500g/min
Max pressure 600 bar
Max temperature 200°C

Separation

Capacity upto 1L
Max pressure 200 bar
Max temperature 150 °C



Specification



Power requirements

415 V (3PH+N+E); upto 64A
(depends on heating options)



Pneumatic Air Pressure (bar/psi)

6.9 bar / 100 psi, 1/4" compression inlet



CO₂ Inlet

55 bar, 1/4" compression inlet



Vent Line

3/4" compression inlet



Weight

350/400 kg (depending on options)



Chiller

Required



PC & Monitor

Minimum of 1.5 GHz, 16 GB RAM, 250 GB storage, Ethernet port for control panel, wired or wireless connection for Internet connectivity. Google Chrome browser. Monitor 21" minimum with 1920 x 1080 pixels resolution

SFX Software



Dashboard visualisation of key processing parameters



Manual control of key components within the SFX system in real time using APC to accurately control the pressure



Recipe menu allows you to automate a variety of conditions including flow rates, temperatures and pressures over a defined time limit.



Real time data logging and visualisation via Grafana Dashboard



Programmable warning and alarm limits to alert the user that the system conditions are approaching the cut off safety limits.



SQL database logs all the alarms and user activity to aid in fault detection and diagnosis.



When dealing with high pressure systems, pressure control is key. Standard control is accomplished using proportional, integral and derivative control (PID). Unsatisfied with the standard level of control, Core Separations developed APC (Advanced Pressure Control). This multilevel PID control achieves superior operational management while maintaining rapid pressure build up.



Core | Control

Our advanced and propriety pressure control system known as adaptive pressure control (APC™), is able to achieve precise control of the back pressure to +/-1 bar. This gives our systems superior control during an extraction process.



Core | Safety

Core systems are designed with modularity in mind. We understand that research requires flexibility, so we build our systems with a robust set of standard features, but leave space to include specialised components to help drive your research forward.



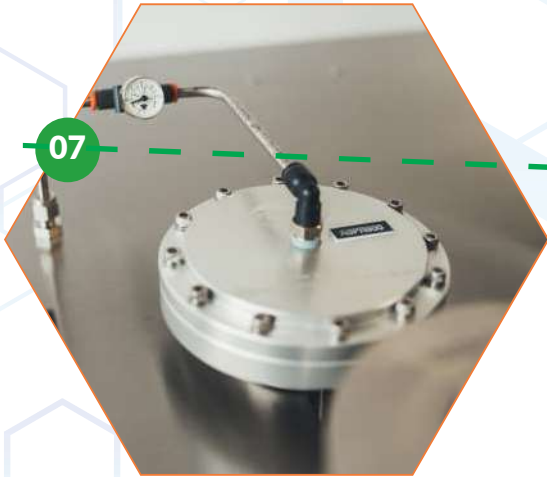
Core | Flexibility

With safety being our highest priority we professionally hard pipe all of our systems using stainless-steel tube. This allows us to offer higher pressure systems giving access to higher CO₂ densities than can be achieved on low pressure systems commonly found on the market.

Certification



Core | Reaction



07

07. Core | **ABPR**

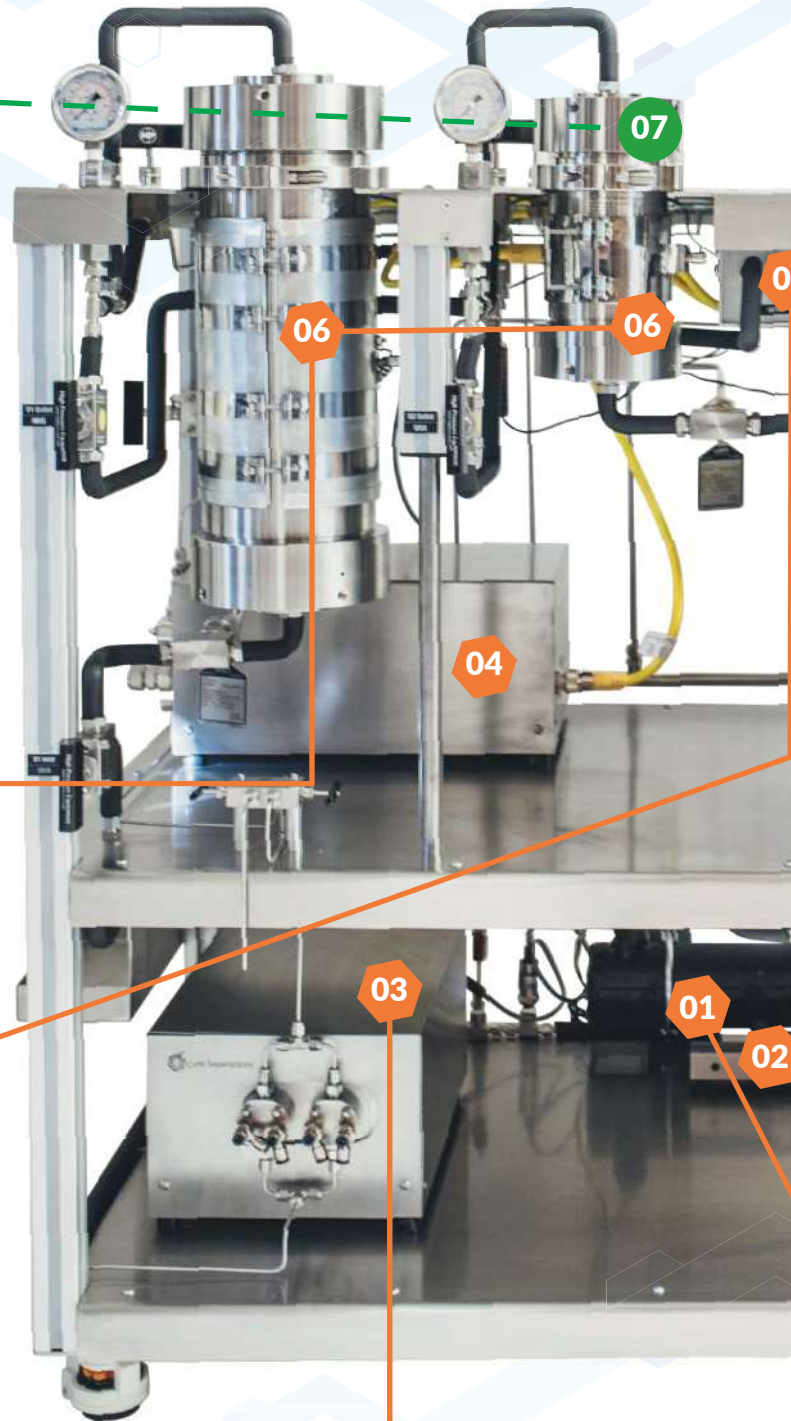
Utilising an electropneumatic back pressure regulator with our APC control mechanism we are able to automatically regulate the pressure in our extractions, maintaining pressures +/- 1 bar of the setpoint.

06. Core | **Extraction**

Utilising a static sprung seal we offer tool-less threaded pressure vessels, designed to withstand 1000's cycles at 689 bar (10,000 psi). We offer a variety of volumes to meet a number of production rates, with our vessels meeting a variety of regional regulations (ASME and PED). This allows us to offer our systems all round the world.

08. Core | **Vaporiser**

Joule-Thomson effect is observed when we go from a high pressure to a low pressure resulting in a drop in temperature. To overcome this, we use a Vaporiser to heat the CO₂ exiting the ABPR. The vaporiser also helps to expand the CO₂ from its liquid state into a gas in-order to help precipitate the extracted components.



03. Core | **CO₂ Pump**

Built from the ground up using our extensive knowledge of CO₂ processing the Core CO₂ pumps are designed for high demand environments such as research and production. Our systems can be built to utilise our wide range of pumps allowing us to achieve flow rates between 5g/min upto 1kg/min.



Part viewed from the front



Part can be viewed from the back



09

11

09. Core | Cyclones

Offering both double end and single ended cyclone designs using either standard PTFE o-rings or sprung seals our systems can accommodate either multiple cyclones for either single pot collection or multi pot fractionation.

11. Core | MBPR

Whether it be a cyclone separator or a cold trap controlling the pressure inside these vessels can aid in collection or in the case of multi cyclone systems result in selective fraction of the extraction feed. By modifying the pressure and temperature in each separator the density can be accurately control to favour the precipitation of some components over other. The manual back pressure regulators facilitate the control of the pressure in each of the separators.

05

05. Core | Pre-Heater

The pre-heater is located just after the pump to control the temperature of the CO₂ reaching the extractor. It ensures the CO₂ entering the extraction vessel is already at the extraction temperature ensuring a controlled extraction process.

02. Core | Flow Meter

Addition of a flow meter improves delivery accuracy by adjusting the flow to compensate for changes in the CO₂ feed density. Although we control the incoming temperature of the CO₂ a drop in pressure from the CO₂ bottle as we consume the CO₂, can result in a density shift causing the pump to under deliver the CO₂ to the process. The flow meter also offers additional process data to be collected in the system, such as total CO₂ used.

01. Core | Condenser

Although we use a liquid CO₂ feed in our extraction systems, its important that the incoming CO₂ remains liquid. The condenser acts to maintain the incoming temperature of the CO₂ ensuring it remains a liquid during the pumping phase. Additional condensers can be added with higher flow rate pumps or the addition of a recycling unit.