

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

Core | **Catalogue**

2022 v1.4

SCIMED[™]
 Core Separations

13. Core | Water

upto 550 bar

The Core | Water system is a subcritical water extraction system that can perform extractions over a range of temperatures and pressures (500 bar @ 400°C).

Compared to organic solvents, subcritical water has tuneable properties such as density, and dielectric constant which can be adjusted by temperature. For example, subcritical water's polarity can be decreased with increasing temperature.

These versatile properties allow the Core | Water system to perform selective extractions of polar compounds at lower temperatures and less polar ingredients at higher temperatures.

Applications

Polyphenols

Flavoids

Sugars

Gycosides

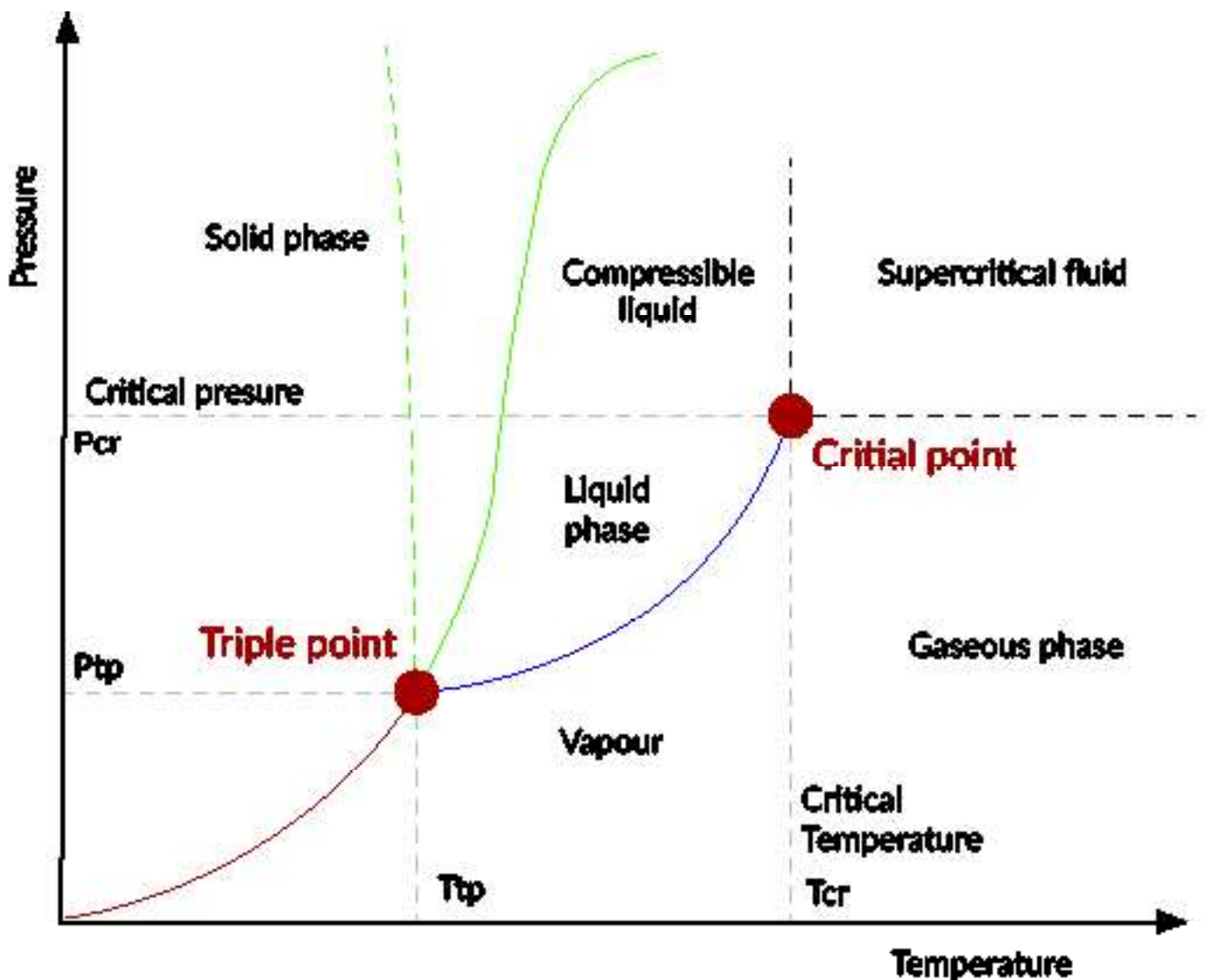
Natural Products



Core | What is SWE Processing

Subcritical-water extraction (SWE) occurs when water is maintained in a liquid state under high pressure at temperatures between 100 and 374 °C. At these temperatures water has a lower dielectric constant, weakening the hydrogen bonds making subcritical water more like less-polar organic solvents such as methanol and ethanol.

At temperatures above 374°C and 220 bar water passes its critical point and enters its supercritical state. In this region water becomes a strong oxidiser and is more destructive than in its subcritical state, making more suitable for reaction over extraction.



High Temperature Water Extraction

The Inconel vessel uses a bolted enclosure sealing on a graph-oil gasket. Encased in a clam-shell furnace to provide superior heating and shield the user from the extreme temperature. Before the water enters the vessel, it is pre-heated to temperatures up to 400 °C via the electrical heat exchangers. Once the water exits the vessel it is cooled via a tube in shell heat exchanger to below 50 °C before entering the ABPR. The water extract is then collected in a 1L colt trap located on the right-hand side of the system.

System sizes available

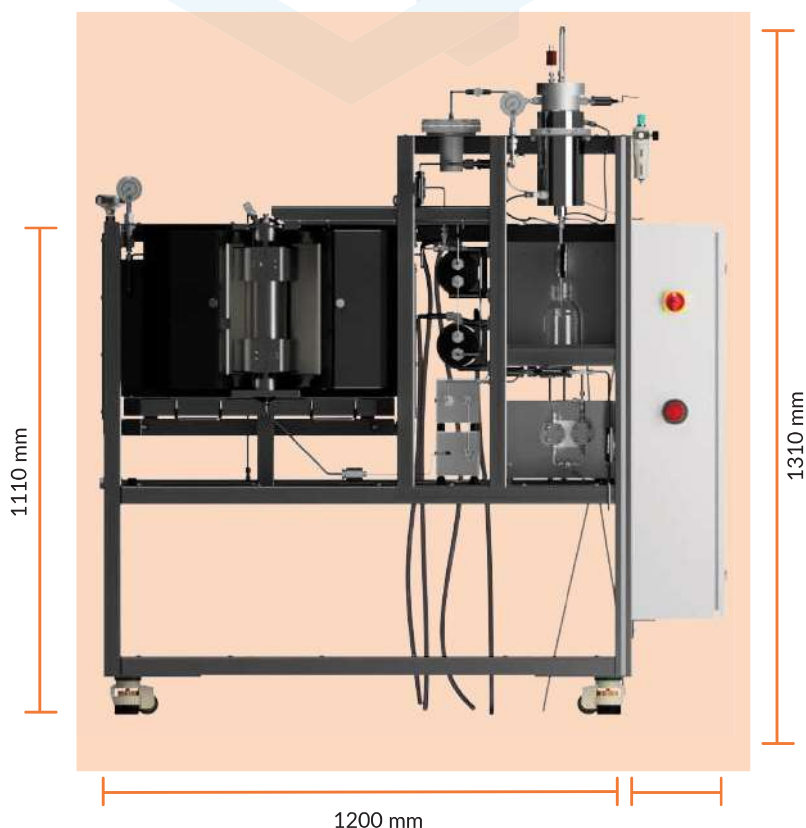
SFXW 500

Extraction

Extractor volume	500mL
Water flowrate	50mL/min
Max pressure	500 bar
Max temperature	400°C

Separation

Capacity	1L
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Specification



Power requirements

415 V (3PH+N+E); 32A



Pneumatic Air Pressure (bar/psi)

6.9 bar / 100 psi, 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.



Speciality Metal : **Inconel**

The **Core | Water** system uses an Inconel extraction vessel, heat exchangers and high-pressure pipework where ever supercritical water is generated. This limits potential corrosion which otherwise would pose safety risk and reduce the life of the system



High Temperature : **upto 400°C**

To generate the high temperatures required for subcritical and supercritical water processing, the **Core | Water** system intergrates a high temperature clamp shell furnace to the heat the extraction vessel.



High Pressure : **500 bar**

The **Core | Water** system has a design rating upto 550 bar and an operating pressure of 500 bar. This wide range of pressures allow for an array of processing conditions making this system ideal for a number of applications, including subcritical water extraction or supercritical water oxidation.

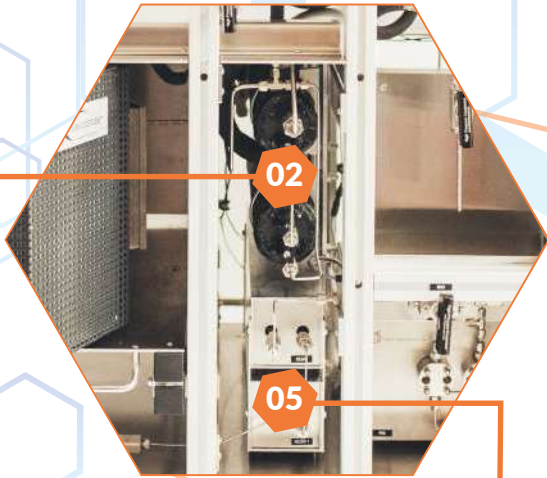
Certification



Core | Water

06. Core | ABPR

Utilising a electopneumatic 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.

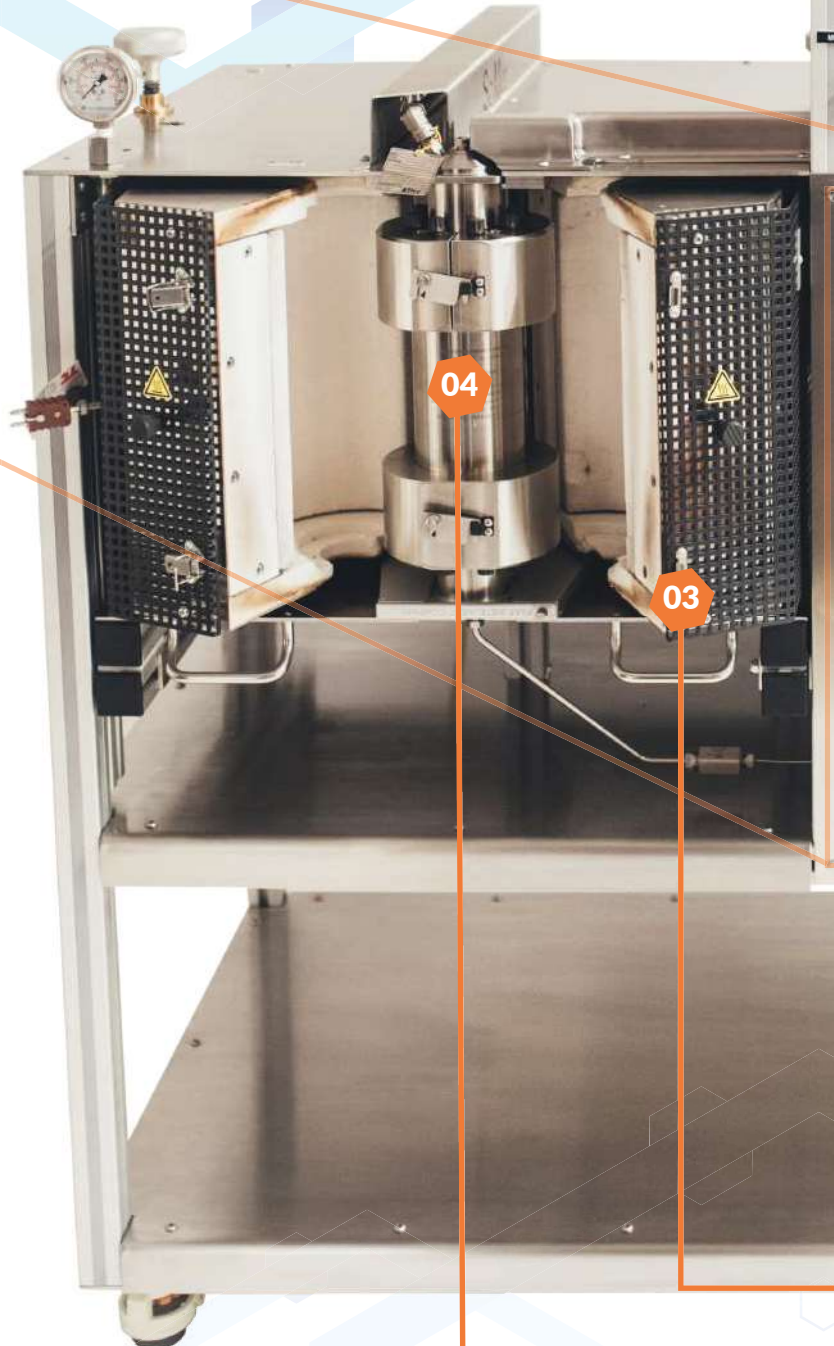


05. Core | Condensers

The heat exchangers are located after the vessel and cool the aqueous stream to below 50 degC before entering the ABPR. This improves the life of the soft seals within the ABPR and helps delivers a aqueous stream at a safe temperature for collection.

02. Core | Pre-Heater

Dual pre-heater designed to heat the water up to 400 °C. These pre-heaters are located just after the pump to control the temperature of the water reaching the extractor. It ensures the water entering the extraction vessel is already at the extraction temperature ensuring a controlled extraction process.



04. Core | Extraction

Specially designed to within stand the extreme conditions generated by supercritical and subcritical water conditions this Inconel vessel is able to resist the corrosive properties of water at these extreme conditions.



07. Core | **Cold Trap**

As the aqueous extract passes through the ABPR and is depressurised, it is collected in a cold trap. The cold trap acts to ensure the collected material is maintained below 40 °C for safe collection.

01. Core | **P50 Water Pump**

Based on our robust dual piston design, the P50 pump delivers 50mL/min of water up to 500 bar generating a pulseless flow during the extraction process.

03. Core | **Furnace Heater**

Designed to heat the extraction vessel to temperatures exceeding 400 °C, this insulated furnace heater allows rapid heat up times while protecting the user from the extreme temperatures required for subcritical and supercritical water processing.