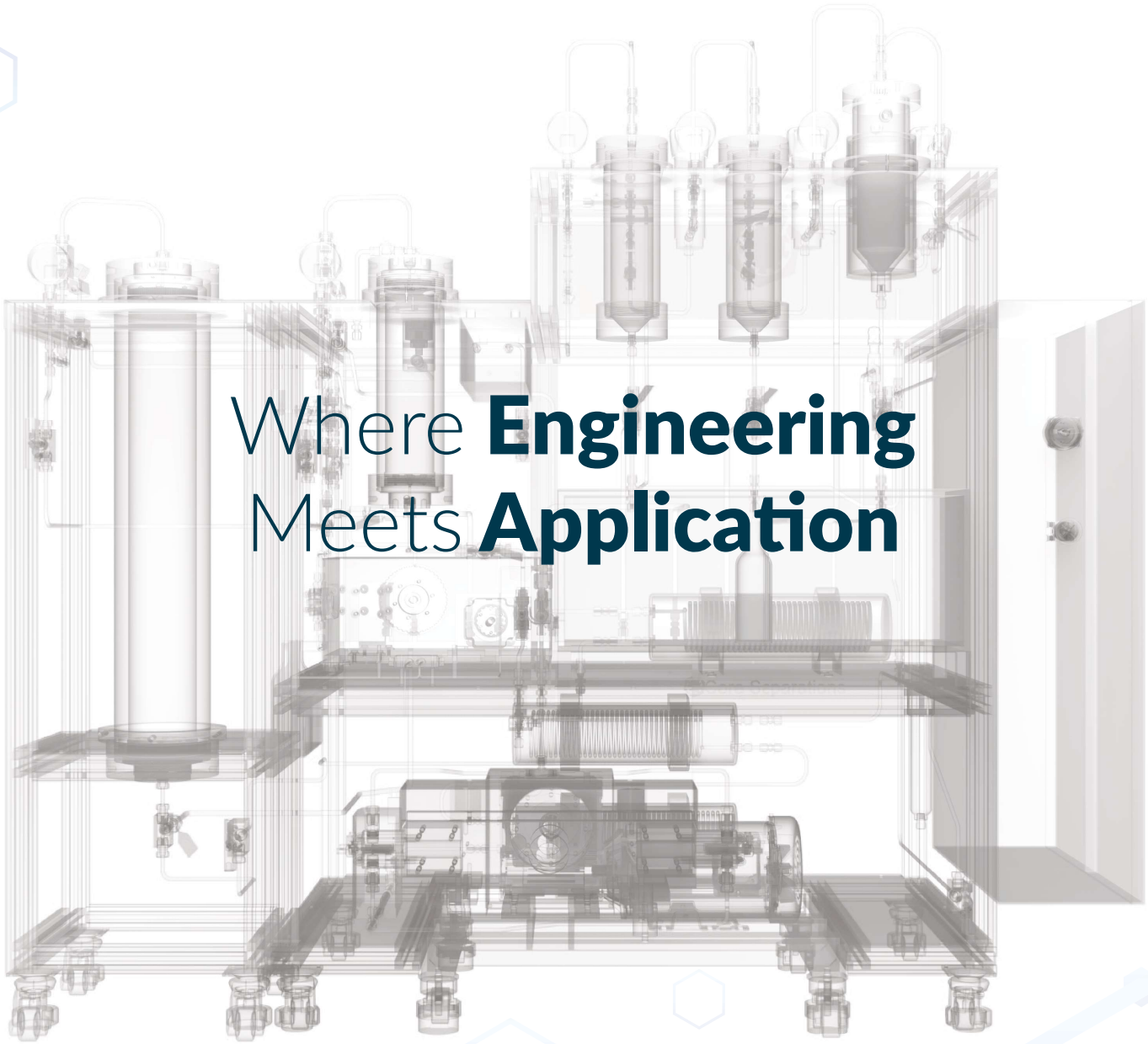


Where **Engineering**
Meets **Application**

Core | **Catalogue**

2022 v1.4

SciMed™
Core Separations

12. Core | **Counter Current Column**

upto 689 bar

Counter Current column is a multi-stage liquid-liquid extraction. Unlike their solid-liquid counter parts (see Core | **Extraction** systems), counter current columns involve continuous separations to produce two feeds. A raffinate which is the fraction depleted of the more volatile components and the extracted phase containing the volatile compounds.

The Core | **Counter Current Column** is a robust addition to supercritical fluid extraction techniques. Designed as a multi piece column for flexibility, our columns can be easily expanded with the addition of further heated zones, making them suitable for the most demanding extraction processes.

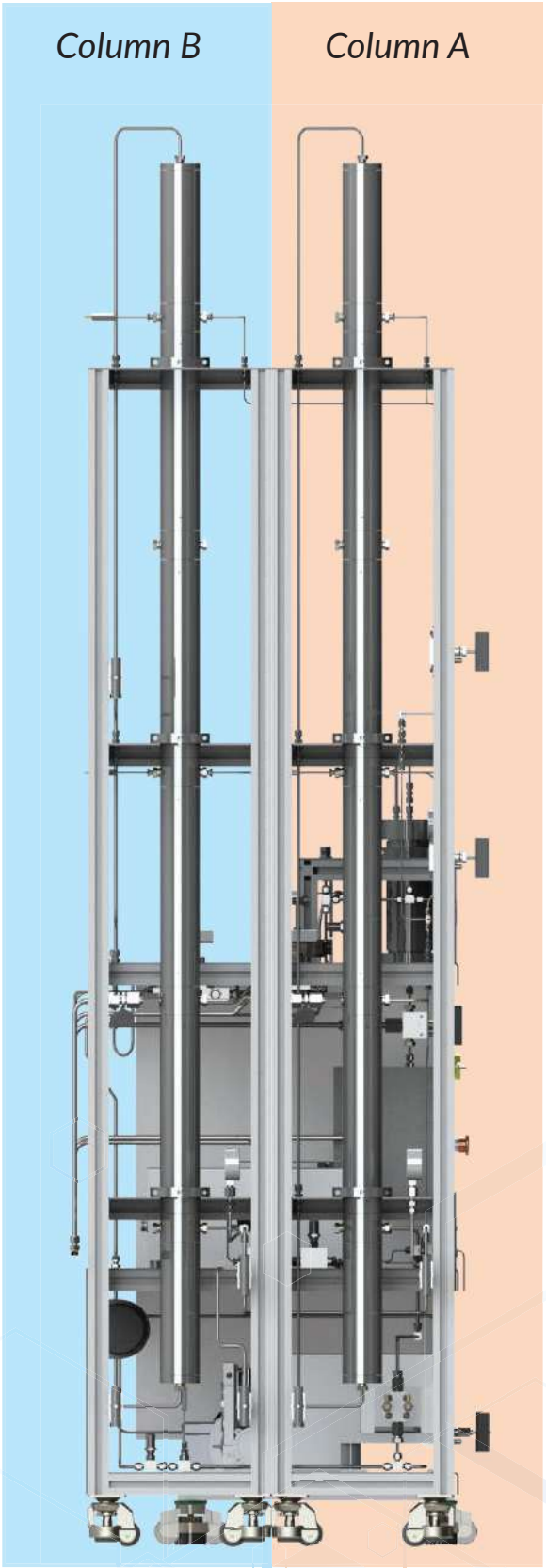
Applications

- Essential oil
- Seed Oil
- Solvent Recovery
- Fat removal
- Alcohol extraction

Pressure, bar	Temperature, °C	Volume L	Heated Zones	Flow Rate, g/min
upto 689	**upto 100**	**2.017**	**4**	**upto 1,000**

Multi column system

To improve productive multiple columns can be installed on a single system. Why not in touch to discuss the different configurations we can offer.



For more infomation: contact@coreseperations.com

Flow Meter	Automated BPR	Cyclones	Control	Certification
Optional	**Standard**	**200 bar Std**	**PLC-PC**	**ASME, PED, CSA, UKCA**

Multi-Section Column

The counter current column is built up of couplers and main body sections. A 2m long column has 6 body sections and 5 couplers joining each section and 2 caps. Only 4 of the main body sections make up the heated zones, with the top section unheated and the bottom section acting as the heavy fraction collection vessel. The couplers each have 2 ports allowing the addition of liquid entry pipes, rupture disk for safety and in-process thermocouples to measure the process temperature at points along the column. Due to the modular nature of the column design further bodies and couplers can be added to increase the effective length of the column to improve separation.

System sizes available

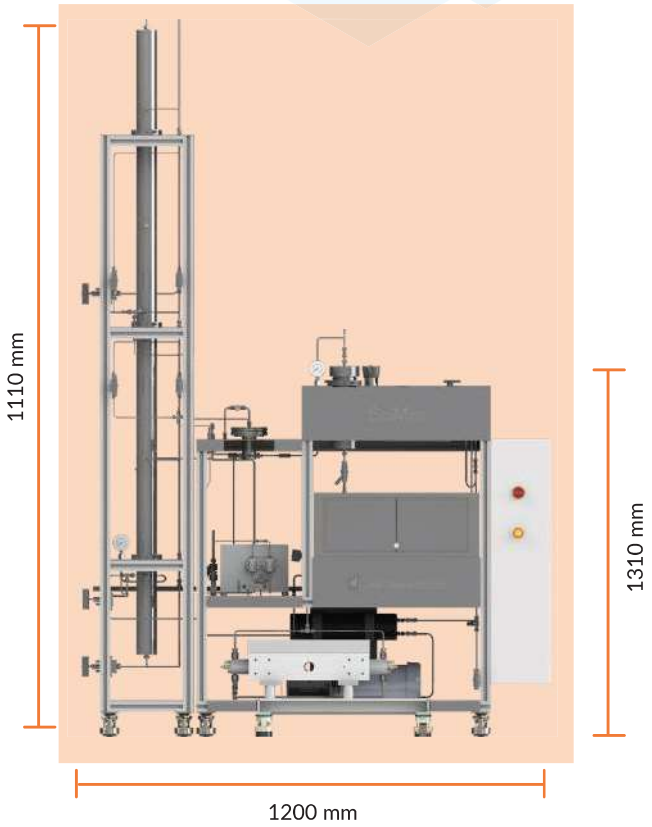
SFX CC2M

Extraction

Extractor volume	2L
CO2 flowrate	500g/min
Max pressure	600 bar
Max temperature	100°C

Separation

Capacity	1L



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.

High Surface Area

Packed with prismic springs the CO_2 flows over the packing placed within the column. Introduction of the liquid feed wets the surface of the packing whcih acts to improves mass transfer.

Mass transfer - total movement of mass from one location to another. The selective interaction of the CO_2 with the compounds creates this separation.

Flexible Design

The column is joined together with couplers This allows the column to be extended to increase the spearation gradient or reduced when height restrictions are present.

Multizone Separation

Our columns are split into several heated zones. Each zone is heated to a different temperature creating a gradient of CO_2 densities throughout the column. Zones can be added and removed to improve separation.

Certification

Core | **Counter Current Column**

05. Core | **Counter current column**

The counter current column is made up of 4 heat zones with an effective length of 2M. A temperature gradient is created along the column altering the CO2 density at each zone, allowing the spearation process to take place. The modular design allows multiple liquid entry points, including the abilty to shorten and lengthen the column.

04. Core | **Co-Solvent**

The use of co-solvent pumps have a number of benefits when incorporated into a system. They allow the introduction of solvent to modify the CO2 polarity. But they can be used for cleaning and the introduction of solutes in the SAS process. The co-solvent pumps like our CO2 pumps have been designed from the ground up. In fact they can be used for both operations with the addition or removal of our cooling cartridges.

06. Core | **ABPR**

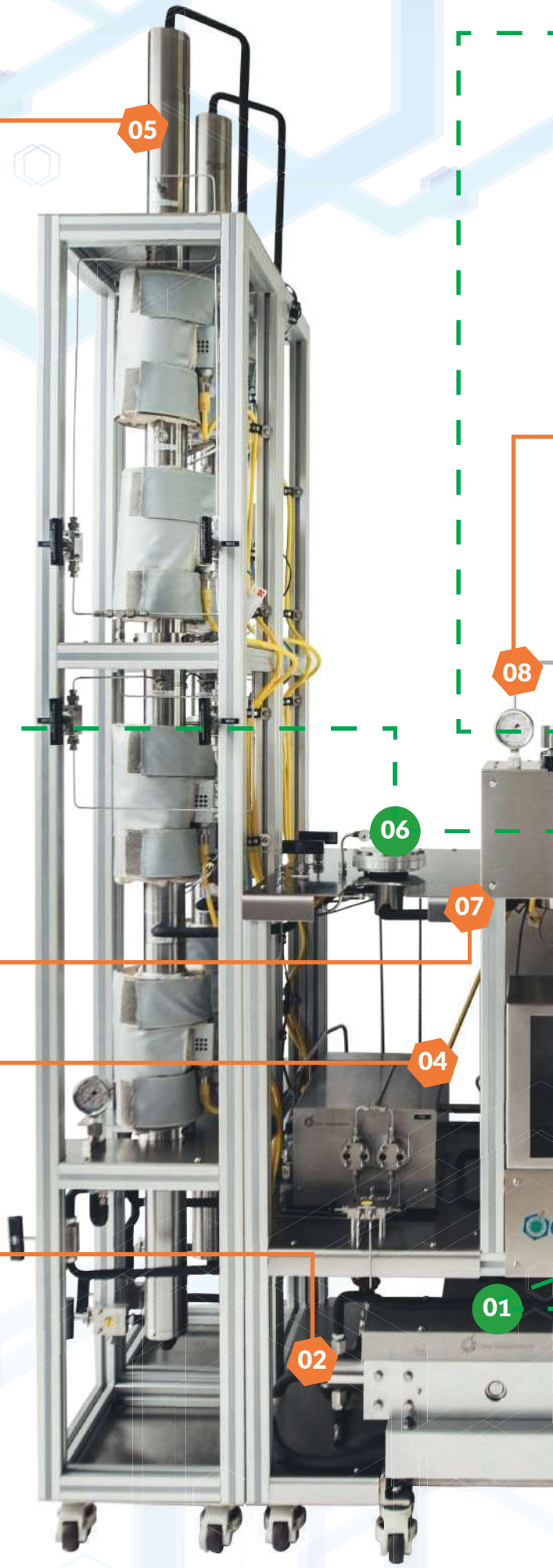
Utilising a electopneumatic back pressure regulator with our APC control mechanism we are able to automatically regulate the pressure in our extractions, maintaining pressures +/- 1 bar of the setpoint.

07. 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.

02. Core | **Flow Meter**

Addition of a flow meter improves delivery accuracy by adjusting the flow to compensate for changes in the CO_2 feed density. Although we control the incoming temperature of the CO_2 a drop in pressure from the CO_2 bottle as we consume the CO_2, can result in a density shift causing the pump to under deliver the CO_2 to the process. The flow meter also offers additional process data to be collected in the system, such as total CO_2 used.

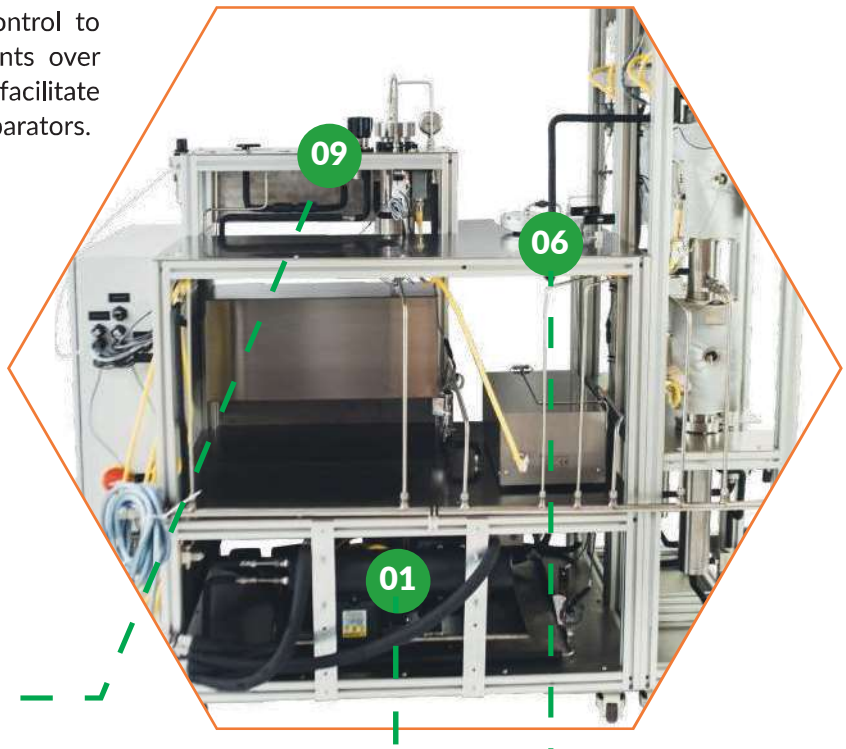


09. Core | MBPR

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.

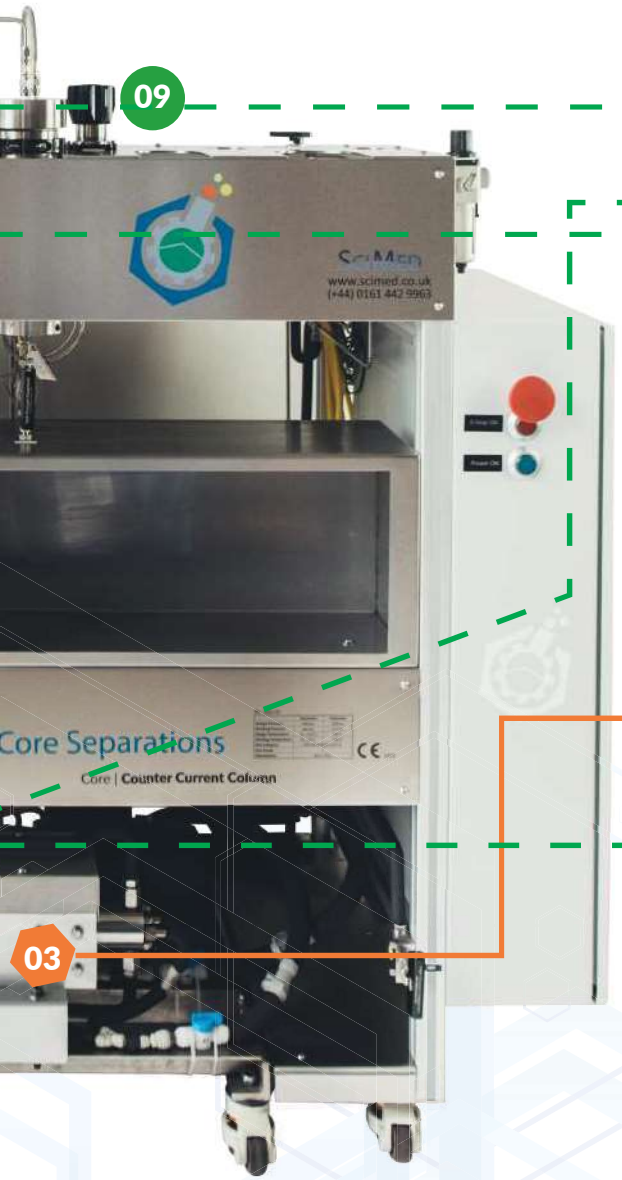
Part viewed from the front

Part can be viewed from the back



08. 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.



01. Core | Condenser

Although we use a liquid CO_2 feed in our extraction systems, its important that the incoming CO_2 remains liquid. The condenser acts to maintain the incoming temperature of the CO_2 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.

03. Core | CO_2 Pump

Built from the ground up using our extensive knowledge of CO_2 processing the Core CO_2 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.