DCI Test Systems CFAS™ Technology

DCI patented CFAS (Continuous Flow Acoustic Separator) Technology combines DCI's two phase acoustic separator with two VPA syringe pumps to provide precise back pressure control and accurate measurement of each fluid phase at reservoir pressure and temperature conditions

- Accurate determination of the volume of each phase produced in a core flood experiment
- Real time measurement of each phase volume
- Not limited to the finite volume of the acoustic separator

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As illustrated schematically here, CFAS™ Technology combines the two phase acoustic separator with two VPA syringe pumps. Two fluid phases (for example oil and brine) are produced from the core sample in a relative permeability experiment. These two fluids are introduced at the inlet of the two phase separator. Gravitational forces cause the two fluids to separate with the lighter fluid rising to the top and the heavier fluid settling to the bottom of the separator. A meniscus forms between these two phases.

The two phase acoustic separator provides an analog output signal that is proportional to the level of the meniscus in the acoustic separator. This analog signal is used as a control feedback signal to a dual cylinder VPA syringe pump. This VPA operates to maintain the meniscus at a constant level. Thus, if the inlet flow into the separator contains any of the higher density fluid, the VPA will retract the piston to draw that fluid out, in order to maintain the meniscus at the desired level. The high accuracy and high resolution of the VPA provides a very accurate measurement of the volume of the more dense fluid that is produced.

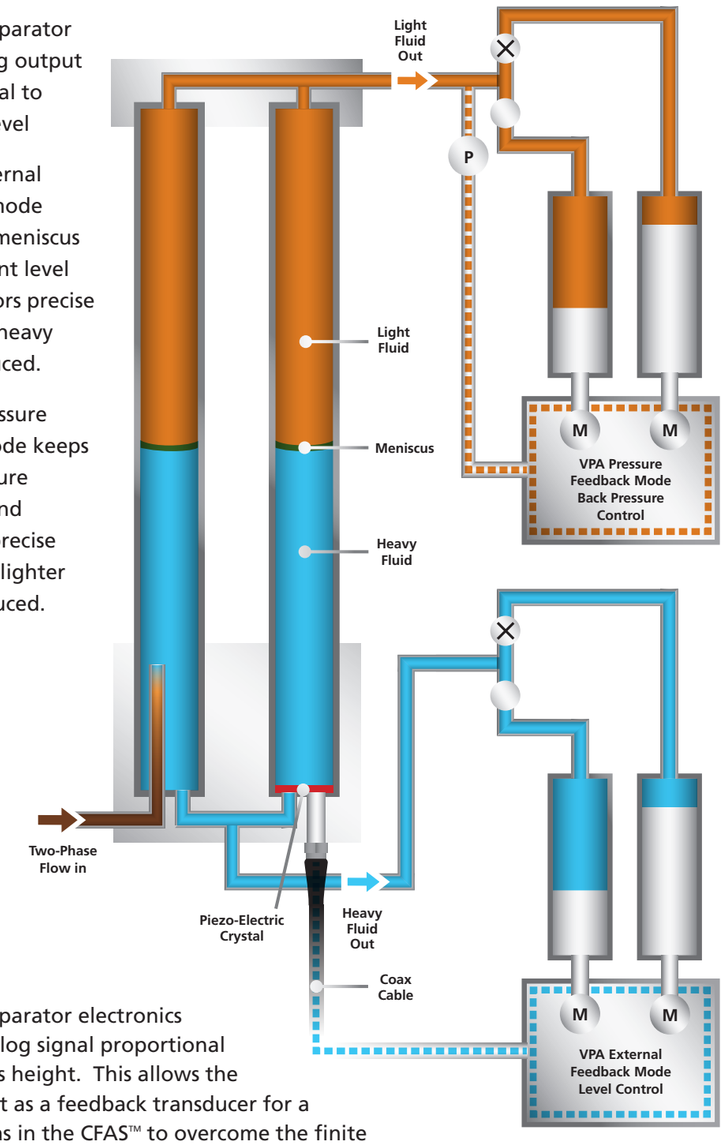
A second VPA is connected to the upper fluid outlet of the acoustic separator. This VPA is operated in pressure control mode. This VPA precisely controls back pressure on the core sample. If any lower density fluid is produced by the experiment, because the first VPA is maintaining the meniscus at a constant level, this additional lower density fluid must be received by the second VPA in order to maintain back pressure at the desired set point. As with the high density fluid, the high accuracy and high resolution of the VPA provides a very accurate measurement of the volume of the lower density fluid that is produced.

This arrangement provides the ability to receive infinite volume of either fluid that is produced by the system. This allows volumes of fluid larger than the capacity of the two phase separator to flow through the sample while equilibrium is established, and still maintain a precise measurement of each fluid volume that is produced.

Another advantage of this arrangement is that there are no small orifices or flow paths in the back pressure control system, as may be the case with a more traditional back pressure control system. Thus, any fines that may be generated by the experiment will not affect the ability of the system to control back pressure accurately.

CFAS™ Technology — CFAST
Continuous Flow Acoustic Separator.

1. Acoustic separator with analog output proportional to meniscus level
2. VPA in external feedback mode maintains meniscus at a constant level and monitors precise volume of heavy fluid produced.
3. VPA in pressure control mode keeps back pressure constant and monitors precise volume of lighter fluid produced.



Features:

- The acoustic separator electronics provide an analog signal proportional to the meniscus height. This allows the separator to act as a feedback transducer for a syringe pump as in the CFAS™ to overcome the finite volume limitation of the separator.
- Proprietary data reduction techniques provide high accuracy, high resolution data.

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Acoustic Separator

Specifications:	
Measurement Accuracy:	0.1 ml
Measurement Resolution:	0.01 ml
Maximum Pore Pressure:	10,000 psi
Maximum Operating Temperature:	150 °C
Wetted Materials:	Titanium

VPA (16D-10-20-100-HC)

Specifications:	
Maximum Pressure:	10,000 psi
Volume Resolution (Encoder Resolution):	2.4 nl
Pressure Transducer Accuracy:	0.1% FS
Wetted Materials:	Hastelloy C-276
D/A resolution:	16 bit
Wetted Materials:	Titanium

DCI TEST SYSTEMS

Quality Engineered Solutions
Based on Proven Technology

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