



VPA SYRINGE PUMPS INTEGRATED INTO CORE FLOOD SYSTEM

Application Note

February 2018

VPA SYRINGE PUMPS KEY FEATURES

VPA Syringe Pumps Getting More Out of Your Equipment

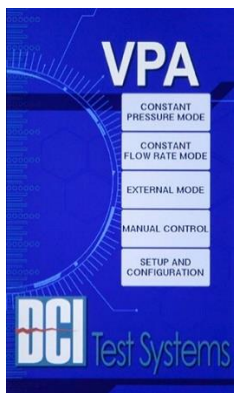
VPA Syringe Pumps are versatile and important part of any lab. For any experiments needed precise flow rates and pressure control, the VPA Syringe pumps are up to the task.

Types of VPAs

Most users know that syringe pumps are available in both single and dual cylinder configurations, but VPA syringe pumps are also available in a "dual single" configuration where each cylinder operates as a single cylinder pump. The advantage of the dual single configuration is cost. Because the dual single configuration shares structure, electronics, and automatic valves, DCI is able to provide basically two pumps for a fraction more than a single cylinder pump alone.

Control Modes

DCI's integrated software controls the VPA syringe pump in five main modes: Pressure, Flow, External, Manual, and Profile. While Constant Flow Mode and Constant Pressure Mode are self-explanatory. External Mode and Profile Mode are exceptional features that will allow users to do more with their pumps.



External Mode allows users to connect any external transducer that is controllable by flow or pressure and have the VPA syringe pump control to a desired process variable. The 4 pin connection on the side of the pump provides 24VDC excitation to power external transducers and a +/-10VDC analog input configurable to any transducer.

Listed below are a few example of how this mode can be used:

Displacement sensors– The VPA syringe pump can control to a user entered sample

Intuitive touch screen user interface

Easy to used control modes for any application

State-of-the-art motor and control for best possible accuracy

Wiper seal design for low maintenance

Base models pumps come standard with integrate automatic valves

External mode to allow control of the pump from any transducer

Profile mode for controlling the pump from a computer to a user entered profile

Two size frames each with an array of volumes and pressure rating that will fit every users need

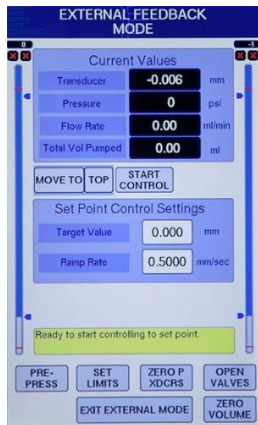


strain. This can be used for pressure draw down tests where net overburden pressure may be changing, but the user wants to vary confining pressure to hold lateral strain constant. Better simulating reservoir conditions.

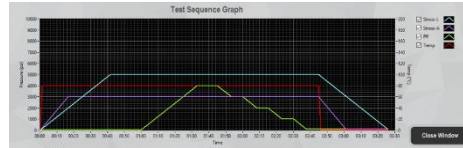
Load Cell – The External feedback mode can be used to control a user entered load/stress. This can be used with controlling axial load/stress on a rock sample.

Fluid Level – Another use is for the VPA to control fluid level in a two phase separator. Paired with DCI’s CFAS™ Technology any electrically monitored two phase separator can be turned into an infinite volume separator.

Some of the other parameters that could be controlled with external control: pH, viscosity, salinity, plus much more.

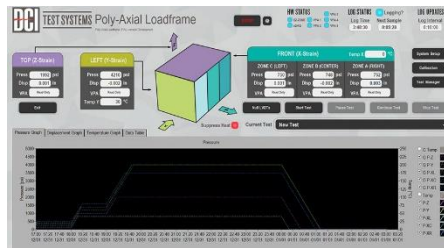


Profile Mode allows the user to set/program a pressure or flow profile. A profile can be programmed to run for 1 minute or 5 days there infinite options here. Using DCI software multiple VPAs can be configured to create load profile for multiple load directions.



The figure shows a profile for a pressure drawdown test used on a rock compressibility systems controlling axial stress, confining pressure, and pore pressure.

Rock mechanics systems are another example where profile mode is utilized. Both triaxial and polyaxial systems take advantage of the profile software for controls. The image below shows how profile mode is used to control load profiles to 5 separate stress planes.



Harsh Environments

Mechanical components of these pumps are capable of high temperatures. DCI routinely mounts cylinders and automatic valves in air baths up to 150°C.

Outside the Oil and Gas Industry

While high pressure syringe pumps are typically used for simulating reservoir conditions and flowing fluid through rock samples, there are a number of applications for these pumps.

These application include manufacturing lines needing precise fluid flow at elevated pressures. These applications include material coating, batch delivery, HPLC, and controlled pressure environments.

Model Number	Maximum Pressure [psi(bar)]	Minimum Flow Rate [nl/min]	Maximum Flow Rate [ml/min]	Cylinder Volume [ml]	Volume Resolution [nl]	Wetted Part	Outline Dimensions D x W x H [in]
Series 16							
16(D/S*)-2.5-80-400-(SS/HC**)	2,500 (170)	50	400	80	0.74	SS or HC-276	10.5 x 10.5 x 41
16(D/S*)-5-40-200-(SS/HC**)	5,000 (345)	20	200	40	0.37	SS or HC-276	
16(D/S*)-10-20-100-(SS/HC**)	10,000 (689)	10	100	20	0.18	SS or HC-276	
16(D/S*)-20-10-50-(SS/HC**)	20,000 (1379)	6	50	10	0.09	SS or HC-276	
Series 32							
32(S/D*)-3.5-550-550-(SS/HC**)	3500 (238)	330	550	550	5.52	SS or HC-276	13.5 x 11.5 x 61
32(S/D*)-5-375-400-(SS/HC**)	5,000 (345)	225	400	375	3.77	SS or HC-276	
32(S/D*)-10-200-195-(SS/HC**)	10,000 (689)	100	200	195	1.96	SS or HC-276	
32(S/D*)-15-120-120-(SS/HC**)	15,000 (1,034)	40	120	120	1.19	SS or HC-276	
32(S/D*)-20-90-70-(SS/HC**)	20,000 (1,379)	13	90	70	0.73	SS or HC-276	

* Available in a (S) Single, (D) Dual, or (DS) Two Single Cylinder configuration

** Available in (SS) Stainless Steel or (HC) Hastelloy C 276 wetted parts