



# 美国千德乐工业仪器公司 **Chandler Engineering**

## DFS-9000岩心伤害测试系统 产品介绍

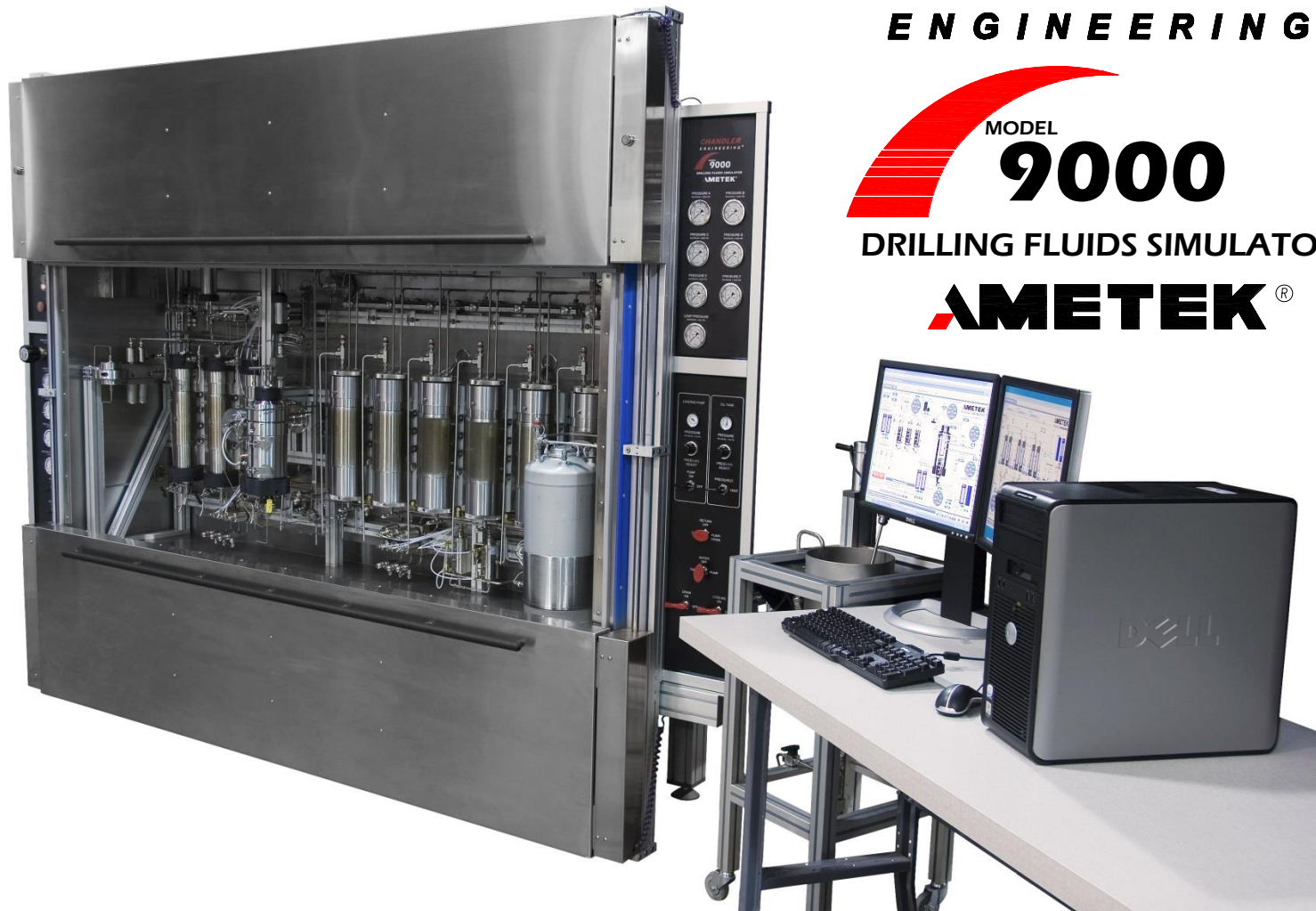
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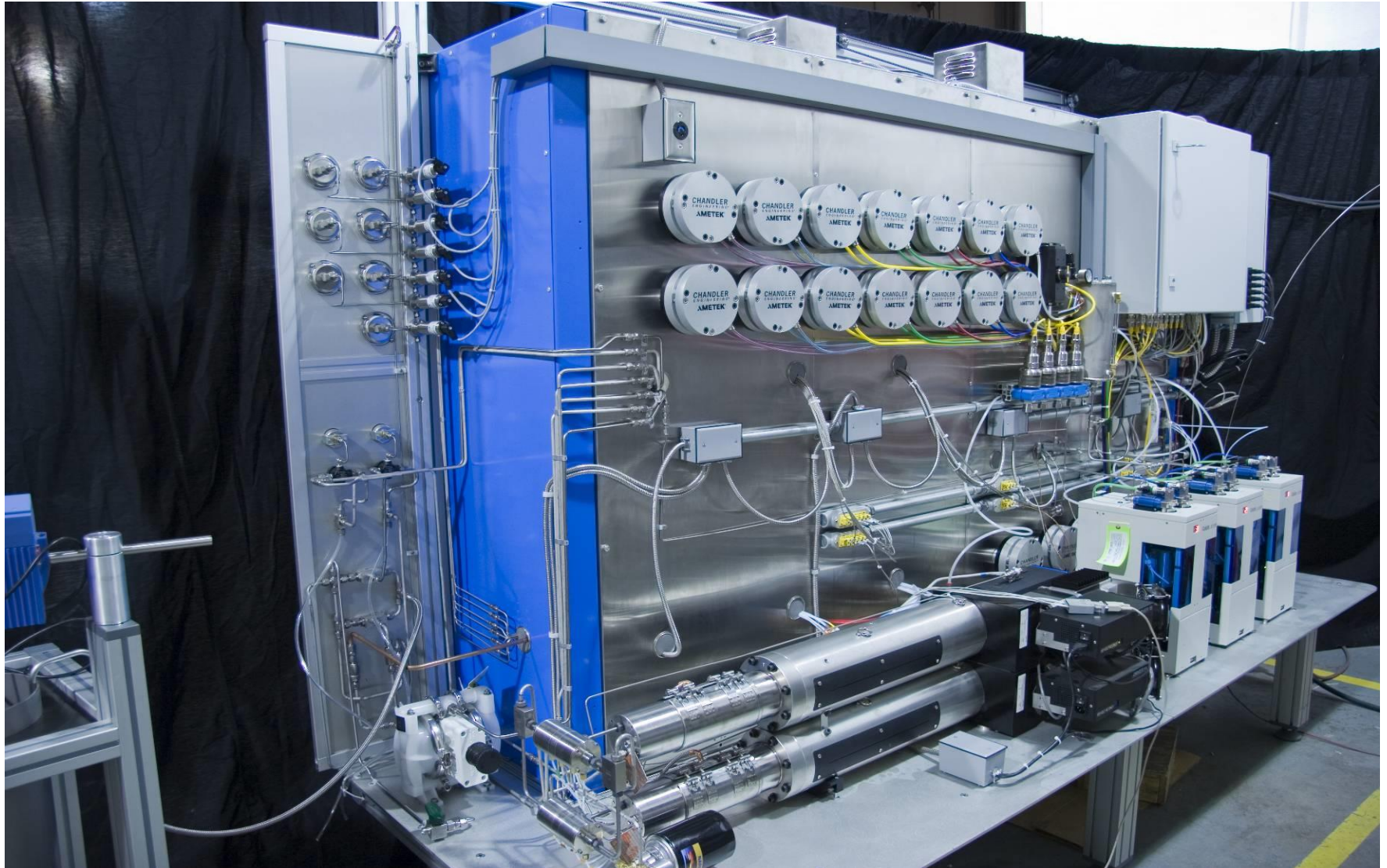


**CHANDLER**  
ENGINEERING®

MODEL  
**9000**  
DRILLING FLUIDS SIMULATOR  
**AMETEK®**









## System Capabilities (系统功能)

Chandler's Model 9000 Drilling Fluid Simulator is capable of the following studies: 能力:

- High velocity circulation of drilling and clean-up fluids past core face for dynamic placement of filter cake and fluid loss studies.  
研究高粘度钻井液或者清洗液在岩心表面高速循环，  
滤饼的动态驱替和滤失
- Mud-off or filter cake lift-off studies. —泥浆清除和滤饼清除研究
- Dynamic gravel pack placement.—动态砾石充填驱替
- Ability to press screen against filter cake or pack.-筛管紧贴滤饼和充填层
- Precision injection of cleanup or stimulation fluids. 清洗液或者模拟的液体精确注入
- Nitrogen injection 氮气注入系统



## Specification 技术指标

- Mud Recirculation Loop-泥浆循环回路
  - 3 Viscous, High Solids Fluids (3种高粘流体, 高固相流体皆可)
  - 流速: 0-400 ml/min
  - 温度与压力: 350° F, 5000 psi
- Formation Permeameter (岩心渗透率)
  - 温度与流速: 350° F, 0-50 ml/min
  - 4 Low Viscosity, 3 High Viscosity Clean Fluids (4种低粘度流体, 3种高粘度清洗液)
  - Nitrogen Injection (0-1000 sccm) (氮气注入流速)
- Hastelloy Flow Path (哈氏合金流路)



# Computer Automation （计算机自动控制）

- **All valves, pumps, controllers, temperatures controlled from highly integrated control software.**

所有阀门、泵、控制器、温度控制都由计算机软件控制）

- **Interactive flow schematic on screen.**

（屏幕上有可交互式流程图）

- **Real time trending and logging of measured parameters.**

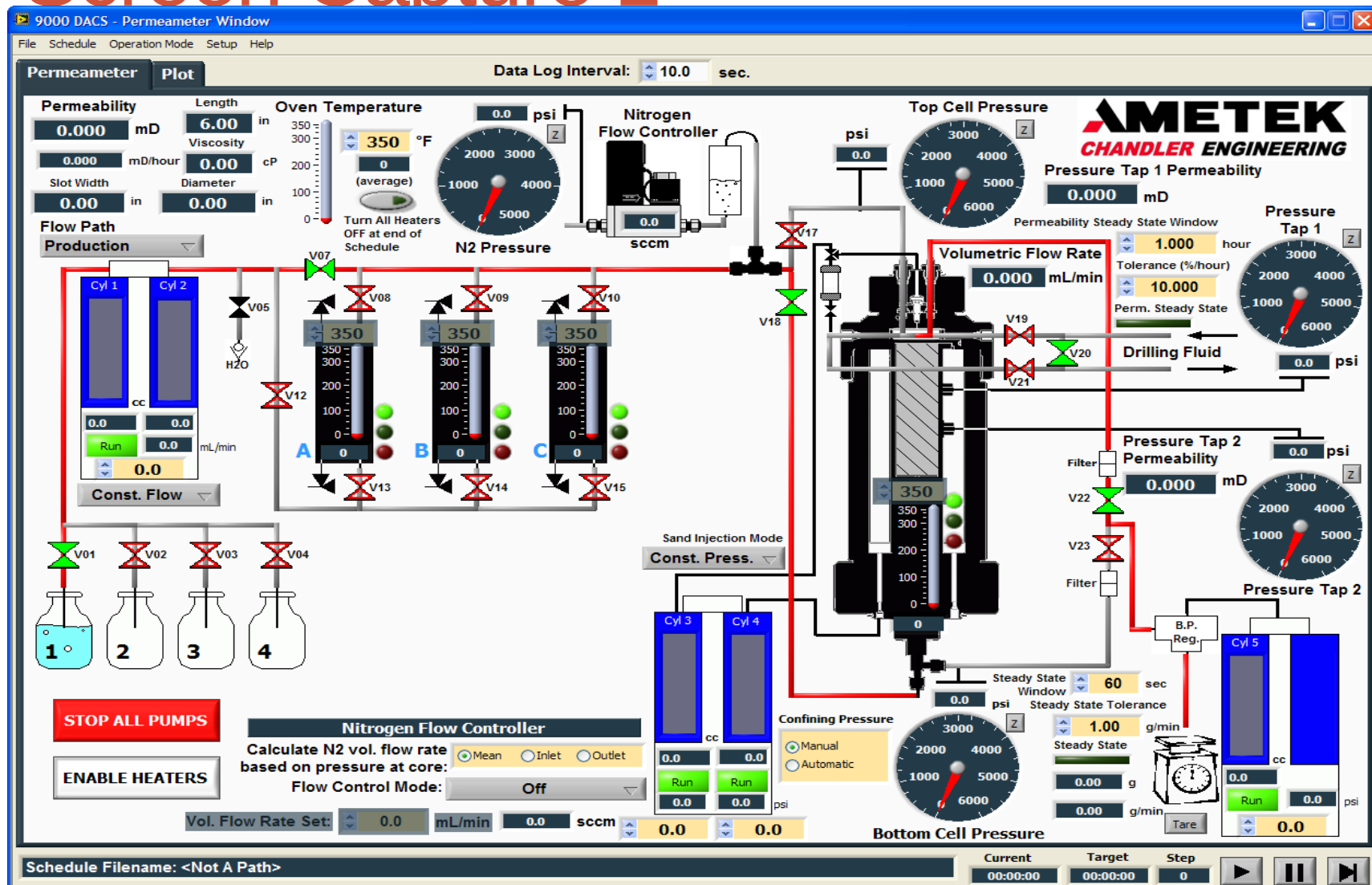
（实时记录实验数据与参数）

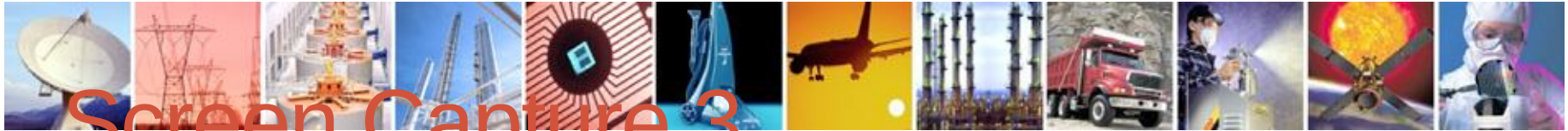
- **Automated test schedules. （自动实验方案）**

- **Calibration utilities. （标定工具）**

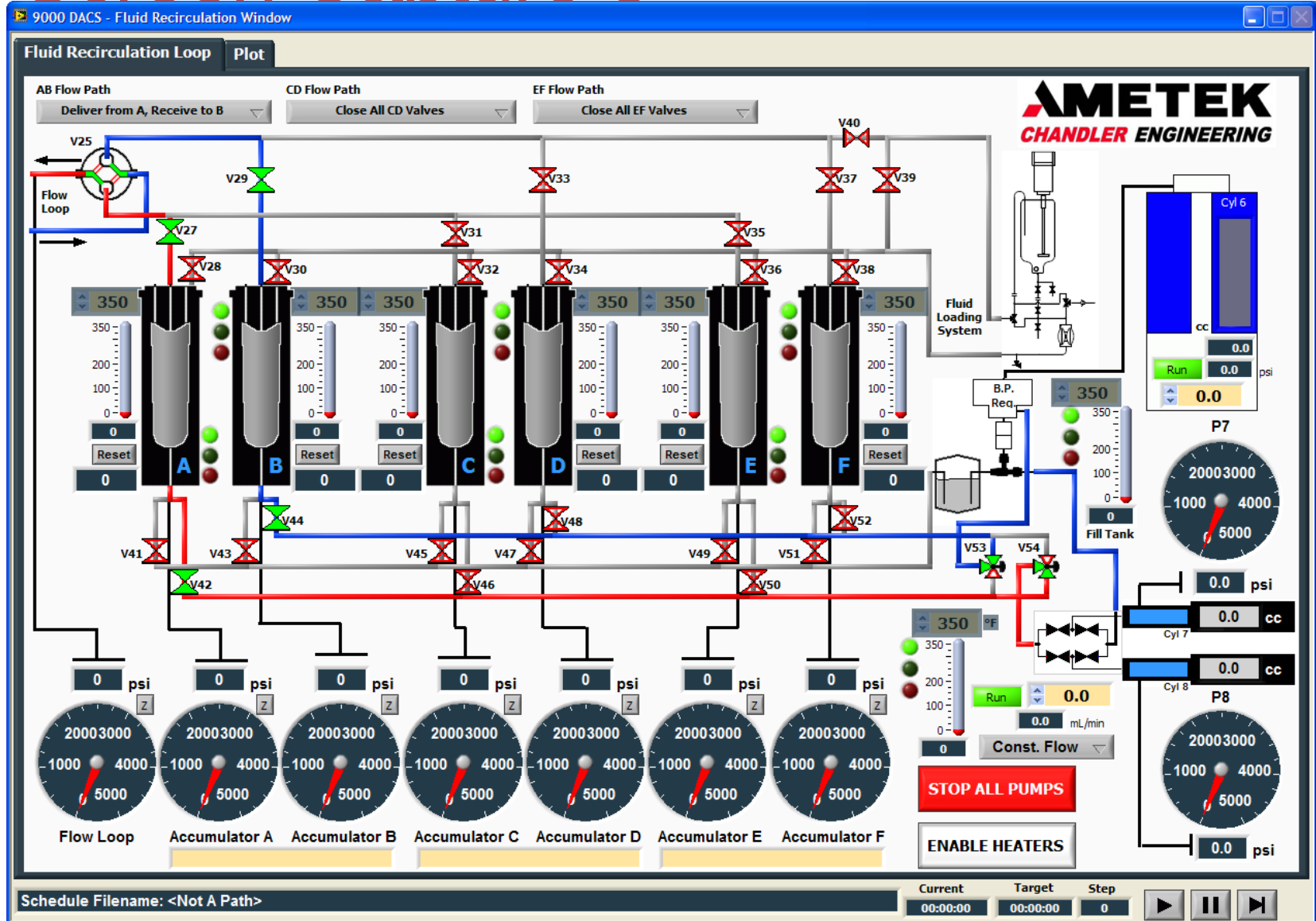


## Screen Capture 1





## Screen Capture 3



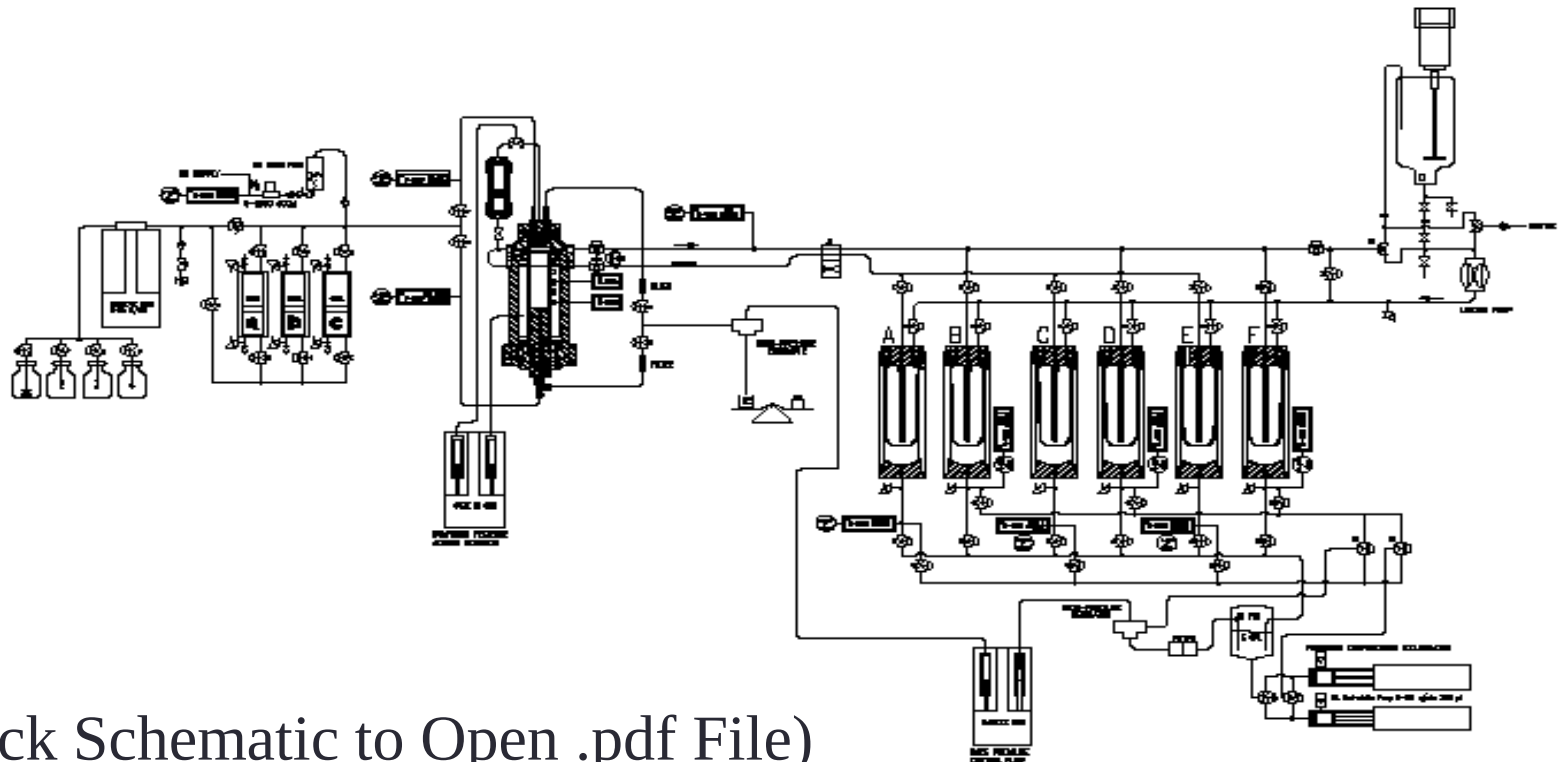


## 系统配备的4套泵参数

- **Q6205 Mud Recirculation Pump (泥浆循环泵)**
  - Max Flow Rate 400 ml/min (最大流速)
  - Max Pressure 5000 psi (最大压力)
  - Cylinder Volume 550 ml (泵容积)
- **QX Sample Delivery Pump HC, Wash Area (样品泵送泵, 哈氏合金)**
  - Max Pressure 6000 psi (最大压力)
  - Max Flow Rate 50 ml/min (最大流速)
- **QX Confining Pressure Pump SS (QX围压泵, 不锈钢)**
- **QX BP Regulator Pump SS - Used as 2 BP control pumps (QX回压调节泵, 用做两个回压压力控制泵)**
  - Cylinder Volume 12 ml (活塞筒容积: 12ml)
  - Independent Constant Pressure Cycled Operation (独立恒压循环操作)



# Plumbing Schematic



(Click Schematic to Open .pdf File)

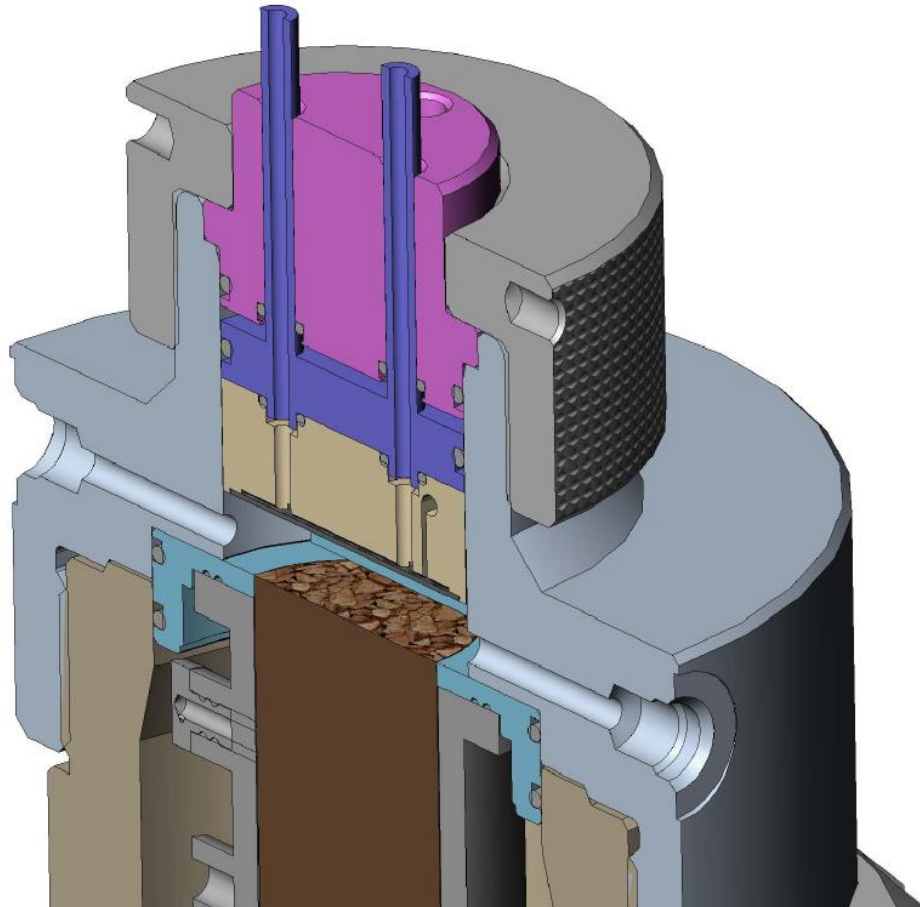


## Core Holder (岩心加持器)

- 6000 psi Confining Pressure (最大围压6000psi)
- 1.5 X 6 Core (岩心尺寸: 1.5 X 6 )
- Flow-Through Head Design (流过端头设计)
- Slot Geometry Inserts (割缝尺寸衬垫)
- Hydraulic Sand Placement (水力砂驱替)
- Interchangeable Screen Adaptors (可互换滤网适配器)



## Core Holder





# BP Regulator Filter Manifold (背压调节阀过滤器管汇)

- Integrated Back Pressure Regulator Filters (集成化回压调节过滤器)
- Easily Replaceable Element (易于替换过滤器芯)
- Spin-off Cup for Easy Cleaning (旋转杯易于清洁)

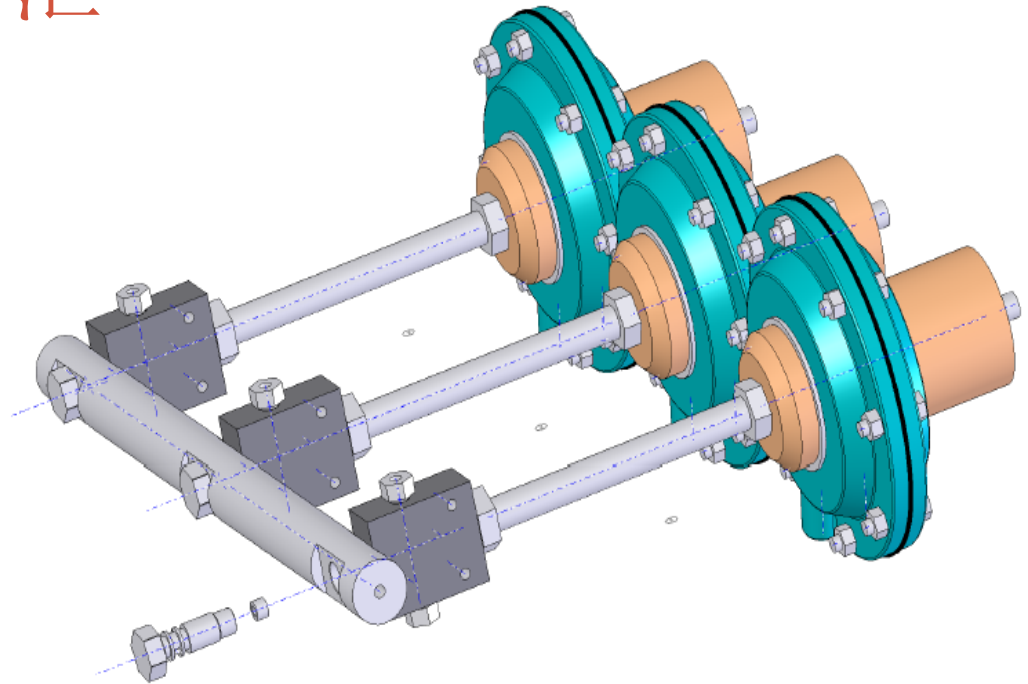




# Mud Recirculation Loop Manifolds

## 泥浆循环回路管汇

- FRT Valve Type for Oil (岩心伤害仪类型阀, 用于油)
- Cone and Seat Valve Type for Mud (锥度和阀座型阀用于泥浆)
- Easily Replaceable Seat (易于更换阀座)





# Cartridge Valve Manifolds (阀体管汇)

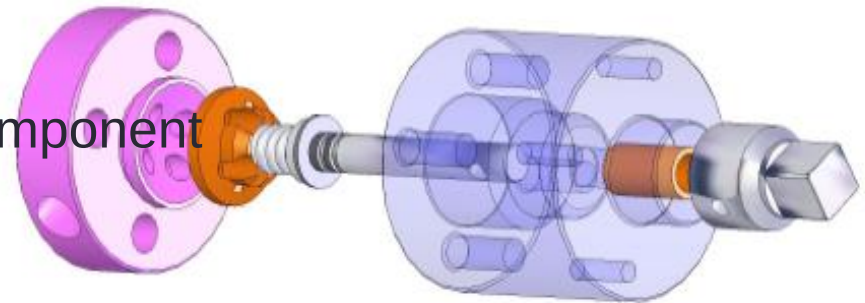
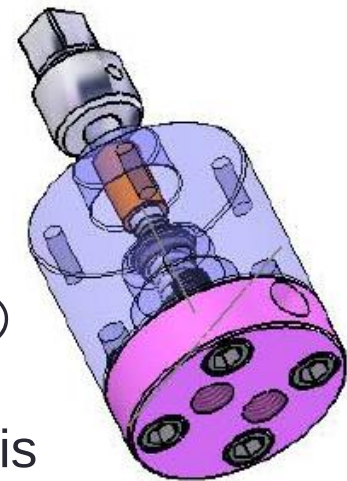


- Optimized for System (优化系统)
- Simplified Plumbing (简化了流程)
- Minimized Dead Volume (最小化死体积)



## 4-Way Valve Design (4路阀门设计)

- Air Actuated, 90° 4-Way Valve  
(空气驱动, 90°, 四路阀)
- Chandler Engineering Design (千德乐设计)
- Uses Rotary Valve Actuator (采用旋转阀门驱动)
- Case Pressure > 5000 PSI, 最大压力大于5000psi
- DP > 500 PSI, 差压 > 500 PSI,
- Replaceable Peek Internal Component  
(可替换Peek材料内部部件)





# Temperature Control (温度控制)

- 14 independent control channels.  
(14个独立控制通道)



- All temperature set points updated via software.  
(所有温度点可通过软件设定)
- All temperatures displayed on software screen and logged to a data file. (所有温度显示在软件屏幕上并可记录在数据文件中)



## DFS-9000岩心测试系统主要配置

- One (1) Flush Face Core Holder  
Core Diameter(s): 1.0", Core Length(s): 1.0" to 6.0"
- Quizix QX-6000 Fluids Injection Pump
- Quizix QX-6000 Confining Pressure / Sand Injection Pump
- Vacuum Assisted Core Removal
- Four (4) Clean Fluid Reservoirs
- Two (2) Viscous Fluids Accumulators
- Six (6) Drilling Fluids Piston Accumulators
- Chandler Automated Flow Switching Manifolds, Utilizing Chandler Cartridge Style Valves
- Humidified Nitrogen Gas Infusion
- Oven Assembly
- Data Acquisition and Control System



## Temperature Alarms (温度警报)



- Monitored by additional controller. (有附加控制器监控)
- Redundant T/C per channel. (每个通道配有冗余热电偶)
- 14 input channels. (14个输入通道)
- Additional software monitoring. (外加软件检测)
- Alarms displayed via software popup dialog. (警报通过软件弹出对话框显示)
- Alarms acknowledgeable and resetable via software. (警报可通过软件确认与复位)



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# 系统配套泵---QUIZIX精密数字泵

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## 产品介绍

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## Quizix QX 系列泵



- 紧凑型双筒泵
- 4 种型号
  - QX-0500: 500 psi
  - QX-1500: 1500 psi
  - QX-6000: 6000 psi
  - QX20K: 20,000 psi
- 流速范围: 0.0005 to 500 ml/minute
- 可通过控制面板控制或者通过计算机软件 PumpWorks 控制



## Quizix 5000 系列泵



- 行业标准，用于精密，实际无脉动泵送流体
- 5 种型号
  - 2500 psi to 60ml/minute
  - 5000 psi to 30ml/minute
  - 7500 psi to 7.5ml/minute
  - 10,000 psi to 15ml/minute
  - 20,000 psi to 7.5ml/minute
- 可配置为双筒或者多筒连续泵送流体
- “L” 系列用于流速非常低和需要流速分辨率特别低的情况，流速分辨率0.031nl (0.000000031 mL)
- 温度: 0-160° C
- 可选哈氏合金或者不锈钢



## Quizix 6000 系列泵

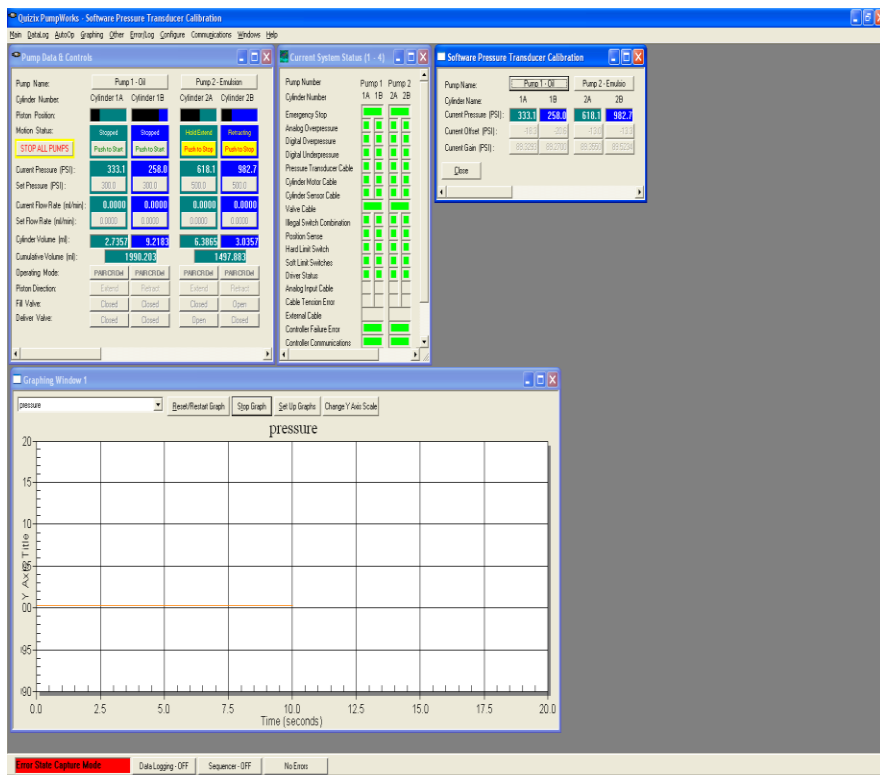


- 大体积,大流量, 泵送液体或气体
- 3 种型号
  - 400 ml/minute @ 5,000 psi
  - 200 ml/minute @ 10,000 psi
  - 100 ml/minute @ 20,000 psi Hastelloy C-276
- 可配置为双筒或者多筒连续泵送流体
- “L” 系列用于要求纳升以下的特别精密的流速控制
- 温度: 0-160° C



# PumpWorks 泵控制软件

- 直观, 基于 Windows 程序
- **15 种标准操作模式**
- 通过一套软件最多可控制**8筒泵**
- 带数据采集与图形化显示功能, 同时也带其它辅助功能
- 可设置程序, 让泵按一定的步骤操作
- 自动侦测周边设备, 带**8个独立 I/O 通讯口**
- 操作简便, 易于控制



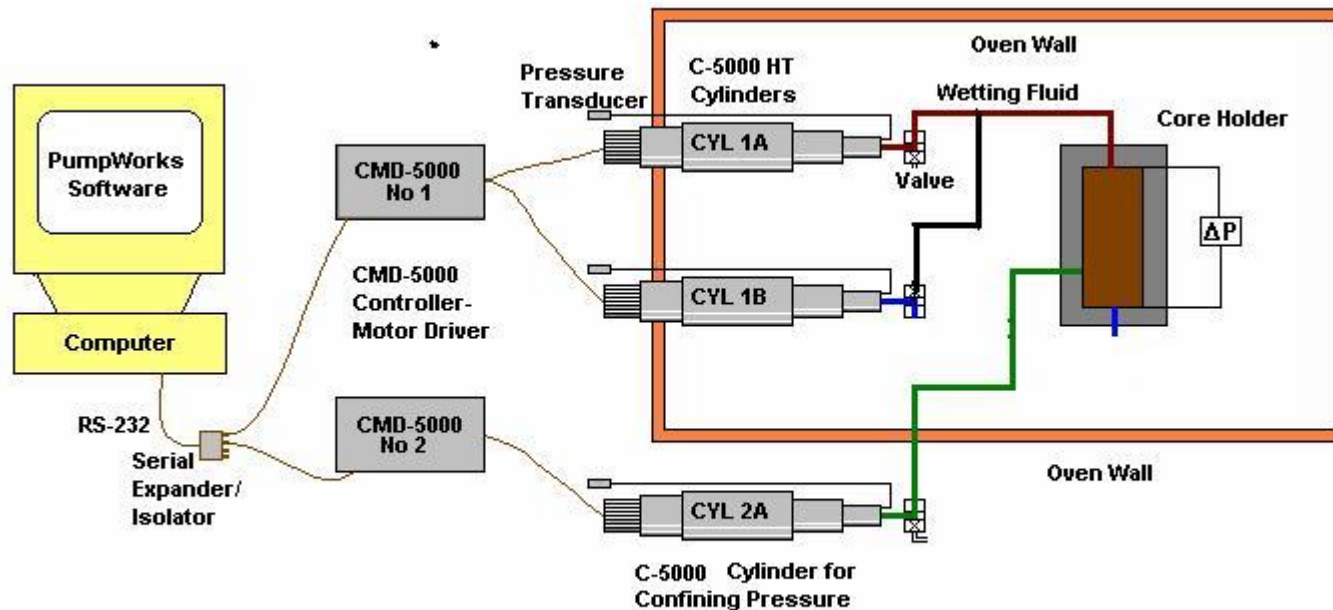


## Quizix 泵的可选项

- 触液材料：不锈钢或者哈氏合金
- 常温型与高温型可选
  - 5000 与 6000 系列泵: 0-160° C
    - 挂在烘箱内或者带加热套
  - QX 系列: 0-50° C
- 5000系列泵可选超低流量型号
  - 纳升以下流量控制
- QX 系列带控制面板
- 5000与6000系列可用做闭环循环流动
- 进口与出口阀可选
- 可选各种型号泵筒配成系统

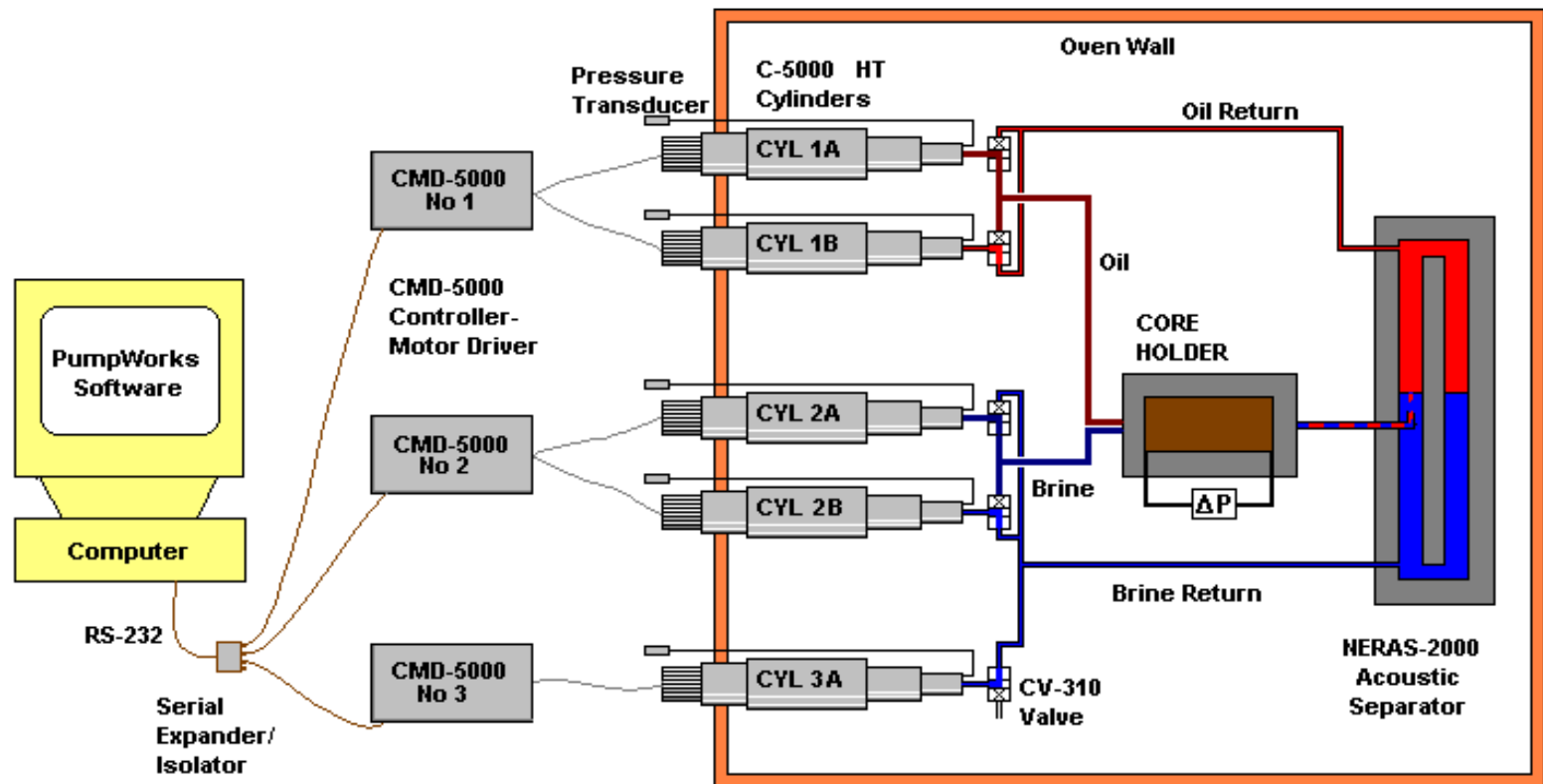


# 常规岩心渗透率测试系统 (3泵系统)



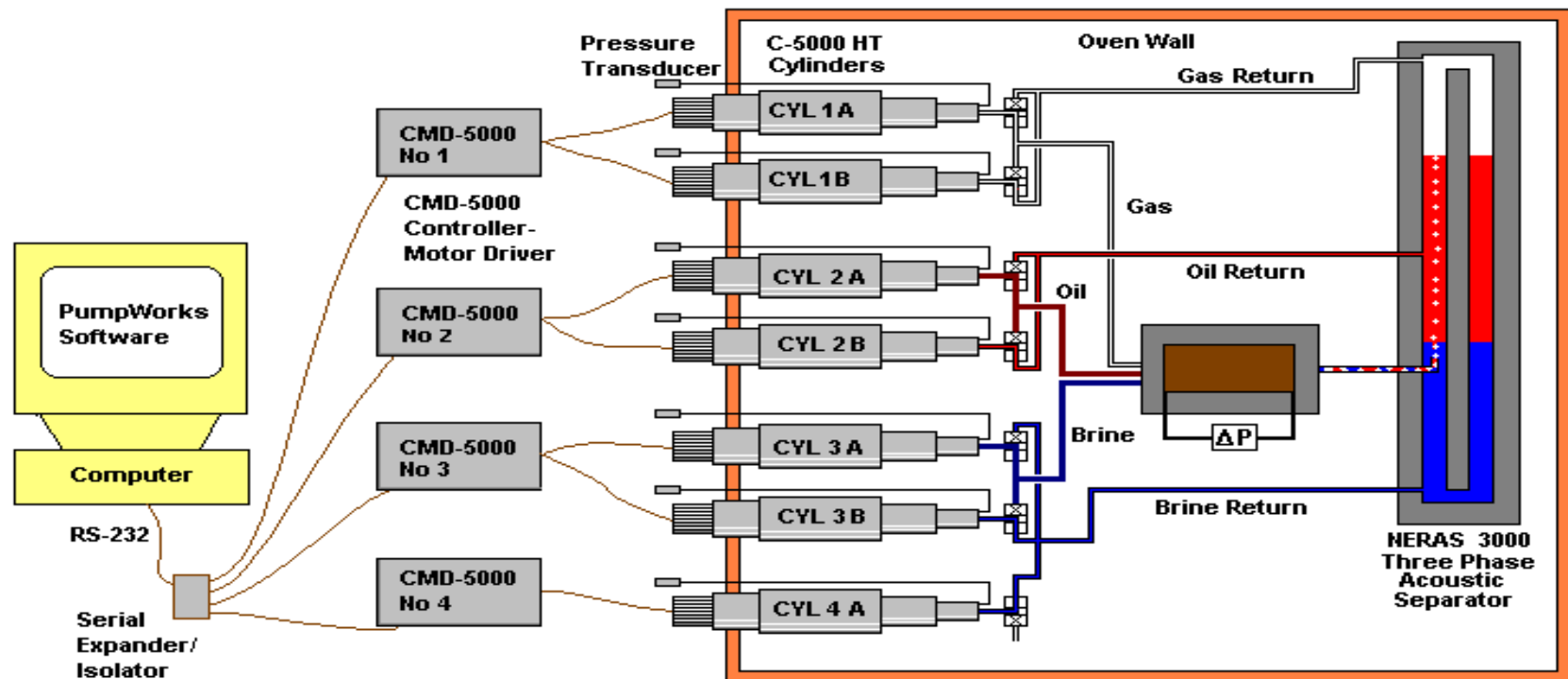


## 2-Phase Recirculating (2相循环流动, 超声波两相分离器, 5泵系统, )





## 3-Phase Recirculating Flow (3相循环流动, 超声波三相分离器, 7 泵系统)





## 总体参数

- 3个系列的泵
  - **5000 Series, 6000 Series, QX Series**
- 从超低流速到高流速各种型号都有
  - **5000 “L” 系列**用于纳升以下超低流速
  - **标准5000 系列**用于毫升以下~ **60 ml/min**
  - **6000 系列**用于高流速~ **400 ml/minute**
  - **QX** 用于常规目的, 流量从0.00015 mL/min -**200ml/min**
- 精密流量或者压力控制
  - 采用**Pumpworks**软件控制, 泵控制方式有**15**种模式
- 轻松处理油、盐水、气体等各种流体
- 系统压力: **0 -20,000 psi**
- 温度: 环境温度- **160° C**
- 多种型号可选
- 千德乐遍布全球的服务支持