

Technology

Encynova's hybrid piston-syringe pumps master a wide variety of liquid delivery tasks. Discrete-volume **DISPENSING** and continuous-flow **METERING** functions are performed easily and accurately with the same pump.

When Accuracy and Durability Combine...

The Encynova design is an internally-sealed, valveless pump technology which integrates the durability of a piston pump with the accuracy of a syringe pump. Now you can move, measure, and control liquid with one compact module. Versatile control options enable fast, effective integration into your system. Excellent repeatability and millions of cycles of piston life provide reliable performance for OEM applications.

A single, offset crank drives precision pistons inside one, two, or four liquid cylinders. As the pistons move fluid in and out of the cylinders, the cylinders slide from side to side, from inlet port to outlet port. The internally-sealed flow path eliminates the need for external valves. User calibration is not necessary. Operating as a continuous-drive, multiple-syringe device, the Encynova System automatically refills and empties each cylinder in succession.

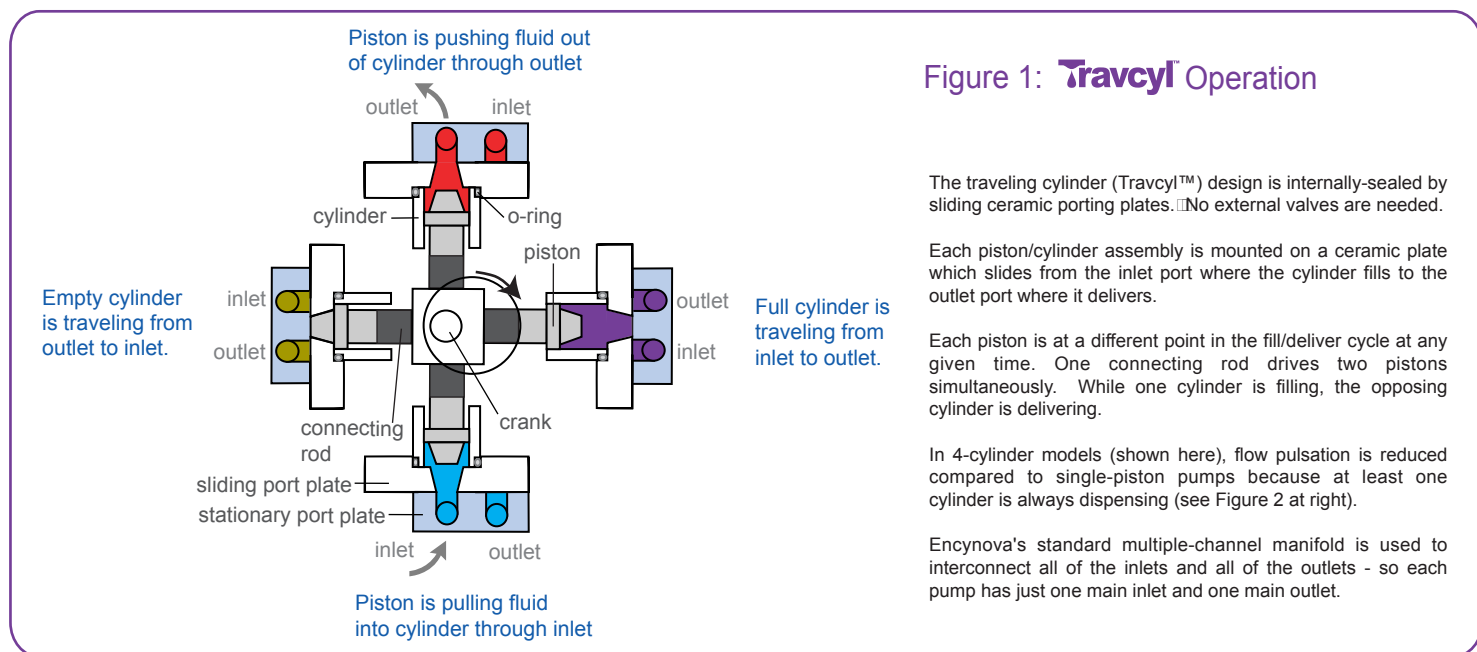


Figure 1: **Travcyl** Operation

The traveling cylinder (Travcyl™) design is internally-sealed by sliding ceramic porting plates. No external valves are needed.

Each piston/cylinder assembly is mounted on a ceramic plate which slides from the inlet port where the cylinder fills to the outlet port where it delivers.

Each piston is at a different point in the fill/deliver cycle at any given time. One connecting rod drives two pistons simultaneously. While one cylinder is filling, the opposing cylinder is delivering.

In 4-cylinder models (shown here), flow pulsation is reduced compared to single-piston pumps because at least one cylinder is always dispensing (see Figure 2 at right).

Encynova's standard multiple-channel manifold is used to interconnect all of the inlets and all of the outlets - so each pump has just one main inlet and one main outlet.

Internally-sealed

Ceramic porting plates internally seal the Encynova System. Valves are not needed because when the motor stops, liquid flow stops. There is never an open flow path between the inlet and outlet. This eliminates potential inlet/outlet liquid contamination and also increases accuracy. There is no drift within the system and air cannot enter the flow path; **there is no dripping and prime is retained.**

Digitally-controlled

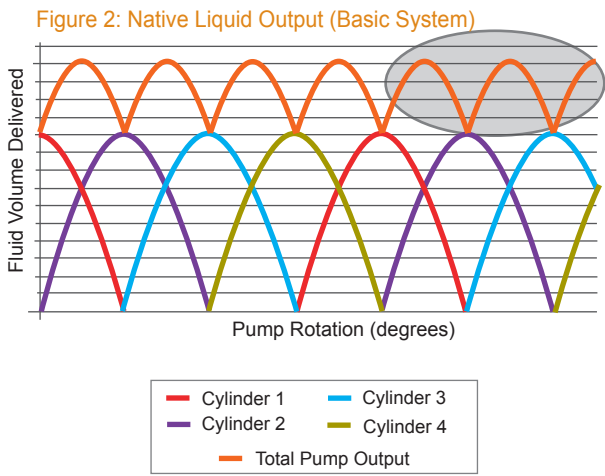
Encynova's high-end pumps (Nova Systems) are equipped with servo motors which accept 8-bit ASCII commands. Digital control of liquid delivery ensures the exceptional repeatability and precision required for automated processes and development applications. Nova Systems control the metering flow rate with the speed (rpm) of the motor, and they measure delivery volume through crankshaft rotation.

User calibration is not required because flow rate and dispense volume are not adjusted by physical re-orientation of parts (as is the case with many other pump technologies).

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Native Pump Output (Basic System Modules)

Figure 2 illustrates the volumetric fluid output of a Basic four-cylinder Encynova System. The total output (orange line on top) is the sum of the outputs from the four individual cylinders over time during constant pump rotation. As shown by the peaks in the total output plot, native operation produces some flow pulsation- up to 20% of total flow. Encynova's software algorithm NovaFlow reduces pulsation by up to 97%.

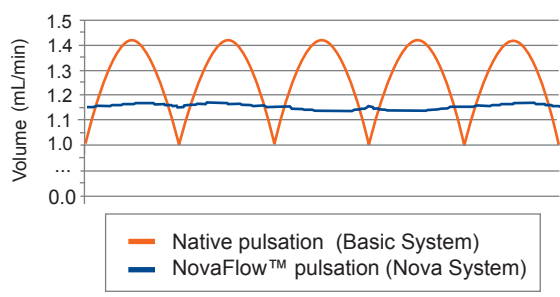


Nova Technology (Nova System Modules)

Nova Technology provides enhanced performance for precision liquid control. Nova technology is standard in all Nova Systems, which are comprised of any 4-cylinder pump head with a servo motor. Two software algorithms, NovaSpense™ and NovaFlow™, are used by the Nova System's servo motor to more precisely control liquid delivery. NovaSpense™ dramatically increases accuracy for dispensing, and NovaFlow provides nearly-pulseless delivery during continuous-flow metering. Nova capabilities are available with the servo motor option for four-piston OEM System Modules (2-4 and 16-4) and are standard features in the Base Station and Satellite units.

NovaFlow™

The metering accuracy of Basic Systems is exceptional. However, when low-pulsation is also required, NovaFlow™ is the software algorithm that reduces instantaneous pulsation to as little as 3% of total flow during metering. NovaFlow™ can be utilized for flow rates between 200 nl/min and 20 ml/min with a Model 2-4 Nova System, or 1.6 ul/min and 200 ml/min with a 16-4 Nova System. Shown at right: 1.15 ml/min flow rate, Native/Basic pulsation vs. NovaFlow pulsation.



NovaSpense™

NovaSpense™ is the software algorithm that controls the Encynova System for exceptionally accurate dispensing. Test results for NovaSpense™ dispensing are shown here. The programmed dispense volume represented is 1.000 mL. The repeatability and accuracy that NovaSpense™ provides are ideal for automated manufacturing and precision laboratory applications.

