Proportional control valve builds a better oxygen concentrator

James Coshnitzke | Clippard Instrument Laboratory Inc. |

According to a recent study conducted by Wintergreen Research, the worldwide market for portable oxygen concentrators is expecting to continued growth through 2019. This is in part due to the baby-boomer population and the need for home-care oxygen therapy. Plus, the number of manufacturers and model choices has increased substantially over the past decade.

This increased need has been the catalyst for improvement in the technology and the demand for portability. Well known as the generation that likes to move about, baby-boomers are not satisfied to stay at home next to an oxygen tank. And, as unit weight decreases and battery life increases, there seems to be no limit to mobility.

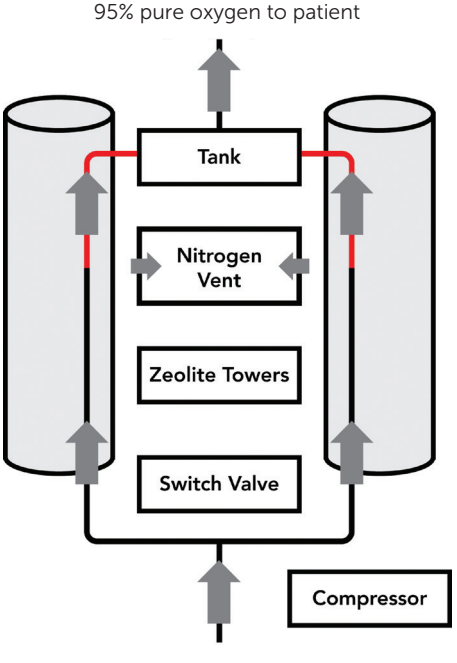
In addition to mobility, portable oxygen concentrators (POCs) are much safer than traditional oxygen tanks. For example, they eliminate the possibility of leaks, which can cause fires and or explosions. Because of this, POCs are approved by the FAA and accepted on most domestic and international flights. Other common places for use are emergency rooms, military field operations, and certain industrial applications. Industrial-application concentrators are not approved by the FDA for medical use.

Several companies now manufacturer POCs. O2-Concepts, with a factory in Newtown, Conn., is one of the more recognized names. Its "Oxlife Independence" portable unit offers both continuous flow (1 to 3 liters/min) and pulse mode settings (0.5 to 6).

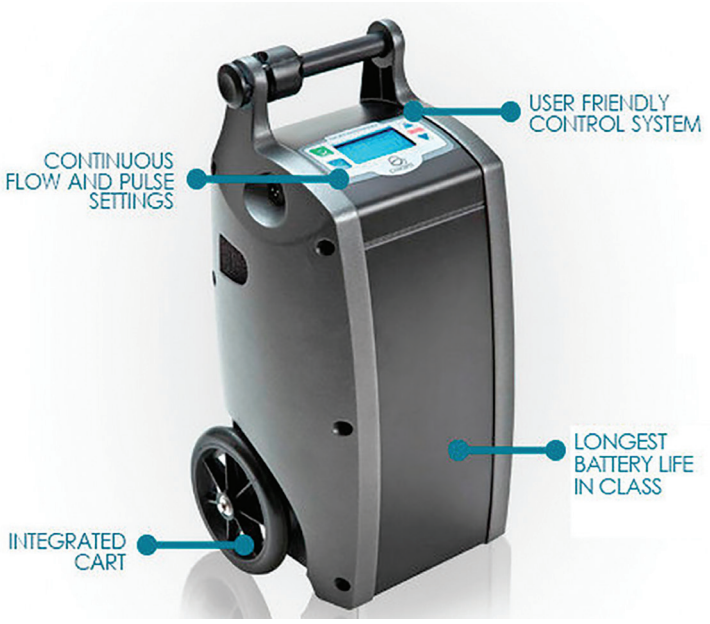
Pulse-dose technology, a relatively new development in oxygen therapy, is incorporated in most new oxygen concentrators. Traditionally, oxygen concentrators provided a continuous supply of oxygen, regardless of whether the patient was inhaling or exhaling. A pulse-dose system delivers oxygen in fixed increments that correspond to the inhalation component of a patient's breathing cycle. In doing so, pulse-dose technology prevents oxygen from being wasted and increases efficiency of an oxygen concentrator. Pulse-dose technology is particularly important in portable oxygen concentrators, which have limited storage.

The typical oxygen concentrator consists of an air compressor, two cylinders filled with zeolite pellets, a pressure-equalizing reservoir, valves, and tubing. It works like this: Room air is pumped into a

How the oxygen concentrator works



A typical oxygen concentrator consists of an air compressor, two cylinders filled with zeolite pellets, a pressure-equalizing reservoir, valves, and tubing. Room air is pumped into a cylinder, where the pellets absorb nitrogen and carbon dioxide and deliver 90%+ pure oxygen to a reservoir. As the oxygen depletes in one cylinder, it releases the nitrogen back into the air. At this time the other cylinder goes through the same process. Together, they create an alternating flow of oxygen into the reservoir, where is stays until the user breathes.



The Oxlife Independence is based on patented Energy Smart Absorption technology. This system uses multiple reservoirs to yield high purities and flow volumes of oxygen at lower energy levels.

cylinder where the nitrogen and carbon dioxide are absorbed by the pellets and 90%+ pure oxygen is pumped into a reservoir. As the oxygen is depleted in one cylinder, it releases the nitrogen back into the air. At this time the other cylinder goes through the same process. Together, they create an alternating flow of oxygen into the reservoir where is stays until the users breathes.

"The Oxlife Independence is unique, due to its patented Energy Smart Absorption (ESA) technology," said Rob Kent, president of O2-Concepts. "This technology uses multiple reservoirs to yield higher purities and flow volumes at lower energy levels. One of O2-Concepts newest offerings is its Dynamic Network Analysis (DNA) technology. We will be using Verizon modems on all units to leverage real-time data."

Success of the Oxlife POC is due in part to the Clippard EVP series Proportional Control Valves. These combine the features of the existing EV series valve – long life, low power, and high-quality components – with the additional capability of proportional control. This series provides air or gas flow control, and varies the output flow based on the current input to the solenoid. The upshot is a high degree of control for many applications. The EV series of valves is capable of over a billion cycles. The EVP valve is intended for analytical instruments, blood pressure monitoring, precise pressure control, patient simulators, gas flow controllers, mass flow control, gas chromatography, respirators, ventilators, and more.

"Clippard's EVP electronic valve is critical to making our ESA technology work, by balancing the loads between the reservoirs. Highly reliable components like this valve make our unit the most reliable on the market," Kent said. "Since using the Clippard valve, the units score better in final inspections. It is now getting a consistent regulated flow and are no longer tackling issues from lot to lot. The valve is consistently manufactured and holds the needed tolerances." M