

# AirSep PSA/VPSA Oxygen Systems



For Commercial and Medical Applications

## AirSep® Corporation — An Organization with a Global Presence

Quality and long-term value are built into every AirSep product for total customer satisfaction. AirSep's commitment to world leadership in expertise, capabilities, and products inspires technologically advanced, innovative solutions for every aspect of oxygen supply needs.

### Pressure Swing Adsorption (PSA) and Vacuum Pressure Swing Adsorption (VPSA) Oxygen

Air contains approximately 21% oxygen, 78% nitrogen, .9% argon, and .1% other gases. AirSep Oxygen Systems separate this small percentage of oxygen from compressed air through a unique non-cryogenic process. Both the PSA and VPSA processes use molecular sieve (a synthetic zeolite), which attracts (adsorbs) nitrogen from air at high pressure and releases (desorbs) it at low pressure.

AirSep Oxygen Generators and Oxygen Plants use at least two vessels filled with molecular sieve as adsorbers. As compressed or pressurized air passes through one of the adsorbers, the molecular sieve adsorbs the nitrogen. This allows the remaining oxygen to pass through and exit the adsorber as a product gas. Before the adsorber becomes saturated with nitrogen, the inlet air flow switches to the next adsorber. The first adsorber is now regenerated by desorbing the nitrogen through depressurization back to the atmosphere, followed by an oxygen purge step. The complete cycle then repeats. Under normal operating conditions and with proper system maintenance, the molecular sieve is completely regenerative and will last indefinitely. The Vacuum Pressure Swing Adsorption (VPSA) process further aids the regeneration or desorption step utilizing a vacuum blower.



ASV27000 VPSA Oxygen Plant at a Wastewater Treatment Facility — Rocky Mount, NC USA



AS-Z5500-HM Duplex PSA Medical Oxygen Plant — Paraguay



Two ASV39000 VPSA Oxygen Plants for ozone generation — Melbourne, Australia



AS-Q2600-HM Duplex PSA Medical Oxygen Plant — Nicaragua



Two ASV33000 VPSA Oxygen Plants at a Gold Mine — Kazakhstan



AS-L1000 Triplex PSA Oxygen Plant for ozone generation — St. Jean, Quebec, Canada



Installed and in operation at a Pulp and Paper Mill since 1991, this 42 TPD PSA Oxygen Plant supplies gas for bleaching and delignification.



AS-P2000 PSA Oxygen Plant (OXYMAR.- by OXZO S.A.) for fish farming — Chile



ASV14500 VPSA Oxygen Plant at a Steel Mill — El Salvador

# PSA Oxygen Systems

## Self-Contained Generators

For unique applications, AirSep offers a range of completely self-contained oxygen generators equipped with air compressors. With the exception of the Centrox, these generators require no special installation. Simply connect the oxygen outlet to your oxygen distribution system and the power cord to a grounded electrical outlet. Turn the unit on and set your oxygen flow rate.

The Onyx and Topaz series are ideal for use where small quantities of oxygen at relatively low pressures are needed. They supply sufficient oxygen for ozone generation, jewelry manufacture, glass work, and various brazing applications. In comparison, the Centrox and Reliant are ideal for use in applications that require oxygen pressures of 12-50 psig (85-345 kPa) at 8-15 LPM.



*Note: The 220 V ~ ±10%, 50 Hz configurations for Centrox and Reliant are available for medical applications for export only outside of the USA.*



*Note: The 220 V ~ ±10%, 50 Hz configurations for AS-D+ – AS-L are available for medical applications for export only outside of the USA.*

## Standard Generators

AirSep Oxygen Generators eliminate the expense, inconvenience, hazardous handling, and storage problems often associated with purchased liquid or high pressure cylinder oxygen. The standard models AirSep offers are the most efficient and reliable generators available today. With their proprietary mufflers, these units also achieve the lowest sound levels in the industry.

Fully automatic, the generators require no specialized operating personnel. Simply connect an air compressor or central air supply to the generator and your application or oxygen distribution system to the generator's oxygen receiver. Then connect the power cord to a grounded electrical outlet, turn the unit on, and set your oxygen delivery pressure. That's all there is to it. A simple on-off switch supplies oxygen whenever you need it.

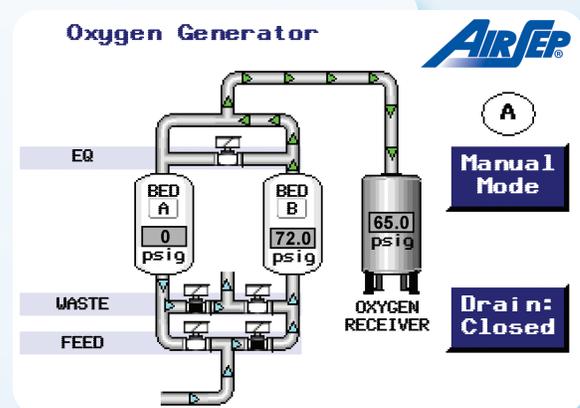
## AirSep PSA Control Systems

AirSep Standard Generator models AS-D+ through AS-P may be equipped with an optional NEMA 4 touchscreen control panel with an integrated oxygen monitor. Standard equipment on models AS-Q to AS-Z, the touchscreen provides a normal start-up system, monitors/controls the operation of the process valves, monitors signals coming from the pressure transducers, and provides an alarm system, as well as a fail-safe shutdown mode. This control panel also features diagnostic capabilities and Ethernet access for remote monitoring of process parameters. The various color screens are easy to follow, as the user-friendly interface maintains a consistent template design.

### Advanced Features and Controls:

#### Control and Monitoring

- 5.7" multi-color touchscreen operation interface
- Oxygen concentration measured by ultrasonic technology, which eliminates regular calibration or cell replacement
- Data logging
- Remote monitoring capability
- Multi-level secured access for supervisory control
- Multi-language option
- Alarm and process parameter notifications via email
- Visual recommended service maintenance reminders
- Parameters displayed in metric or imperial units
- Real time trends of process parameters
- General maintenance guidelines



## Packaged Systems

These skid-mounted or containerized, turnkey packaged oxygen systems are ideal for locations where a compressed air supply is limited or unavailable. Customers without adequate space or those desiring ease of installation or portability, also find these options attractive. Containerized units used for military applications are built to ISO 1-C construction standards. All AirSep Standard Oxygen Generators can be packaged using customer-specified or AirSep-recommended components.

*Note: All configurations for medical gas are for export only outside of the USA.*



Containerized High Purity  
Packaged Plant



Hospital Oxygen Plant

## Medical Oxygen Systems

AirSep has over 4,500 hospital installations in 50 countries worldwide. These plants operate automatically to supply patient, surgical, and critical care units in medical facilities, military field hospitals, on-site emergency preparedness centers, and disaster-relief efforts.

*Note: All configurations for medical gas are for export only outside of the USA.*

## Cylinder Refilling Systems

AirSep Oxygen Cylinder Refilling Plants enable customers to fill oxygen cylinders for existing needs or to supply others. AirSep manufactures a complete line of turnkey oxygen cylinder refilling plants — with capacities from 8-100s of cylinders per day. Complete plants include a feed air compressor, refrigerated dryer or chiller, oxygen generator, oxygen compressor, and a cylinder filling rack. The oxygen compressor delivers oxygen at up to 2,200 psig (15,169 kPa or 151.6 barg) to a high pressure manifold capable of filling up to 10 cylinders at a time.

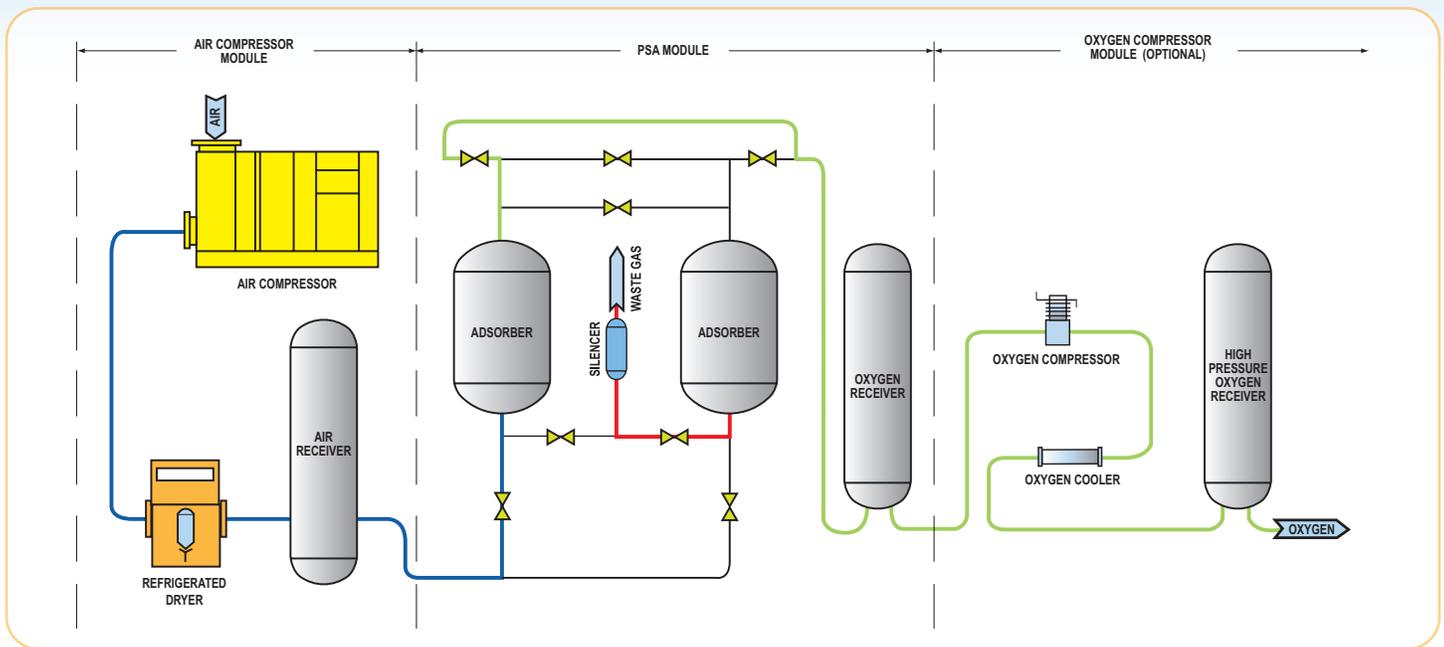
These cylinder refilling plants operate automatically and generate oxygen that meets the United States and European Pharmacopoeia Oxygen 93 Percent (93%  $\pm$ 3%) Monograph. For special applications, an optional high purity module may be added to the plant, to increase oxygen concentration to 99%  $\pm$ 0.5%.

*Note: All configurations for medical gas are for export only outside of the USA.*



Cylinder Refilling Plant

## PSA Plant Schematic – Typical



## VPSA Oxygen Systems

### Tonnage Plants

AirSep Tonnage Plants generate oxygen at nominal 93% concentration. These high efficiency VPSA oxygen plants operate automatically and unattended and include automatic turndown capability with real power savings, touch-screen control with remote monitoring capabilities, low power consumption, and on-line efficiency of 99%.

From 2,000 to 120,000 SCFH (53 to 3,155 Nm<sup>3</sup>/hr), AirSep supplies custom-engineered vacuum pressure swing adsorption (VPSA) oxygen systems.

### AirSep VPSA Control Systems

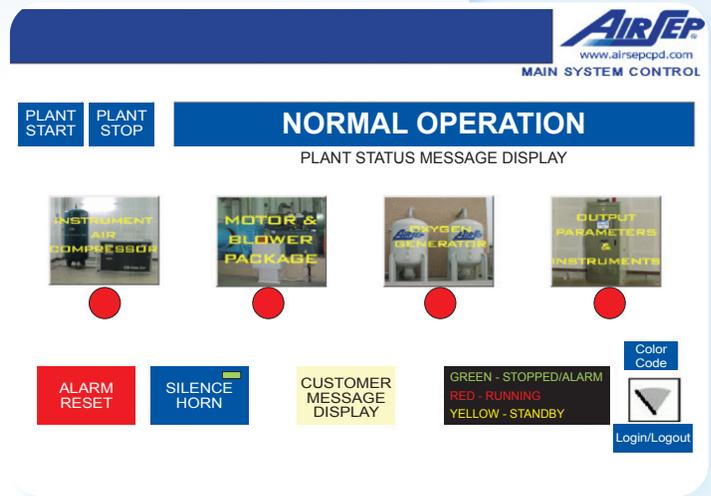
Every AirSep VPSA plant control system monitors and controls the operation of the process valves. In the event of a power or instrument air failure, or even a loss in product concentration, the control system will shutdown in fail-safe mode. The plant's integrated hardware and software monitor critical plant parameters, as well as the performance of the feed and vacuum blowers, instrument air compressor, and oxygen compressor.



## Advanced Features and Controls:

### Control and Monitoring

- Designed in accordance with local and international standards
- User-friendly design
- Integrated hardware and software
- Viewable trends and pressure profiles
- Continuous data recording every 250 milliseconds
- Process optimization may be performed by the operator if needed
- Remote monitoring capability
- Multi-level secured access for supervisory control
- Multi-language option
- Alarm and process parameters notification via email
- Parameters displayed in metric or imperial units



## Purchase Options

Customers may purchase turnkey oxygen plants or technical recommendations, including detailed drawings. In such cases, AirSep will also supply critical components (e.g. valves, molecular sieve, plant controls, etc.).

The fabrication of surge tanks and piping may be accomplished locally under AirSep supervision. AirSep engineers direct the final testing and start-up of the plant and provide custom training.



Two ASV80000 VPSA Oxygen Plants at a Steel Mill  
— Brazil



Two ASV25000 VPSA Oxygen Plant at a Uranium Mine  
— Canada

## Easy Installation

AirSep designs its VPSA oxygen plants for ease of installation. The plant is a highly skidded design and basic installation requires only four field welds. All pipe spools, supports and assembly hardware is provided to minimize assembly time. The valve skids are pre-wired to junction boxes to simplify the electrical installation. Compression modules are available utilizing the same modular construction design. Vessels ship separately for final connection on-site. This design philosophy saves valuable assembly time and resources on site.

## Technical Support

To assist customers in maintaining their oxygen plants in excellent operating condition, AirSep offers comprehensive start-up service contracts. Under these contracts, AirSep technical specialists perform final turnkey maintenance, as well as corrective service if needed.

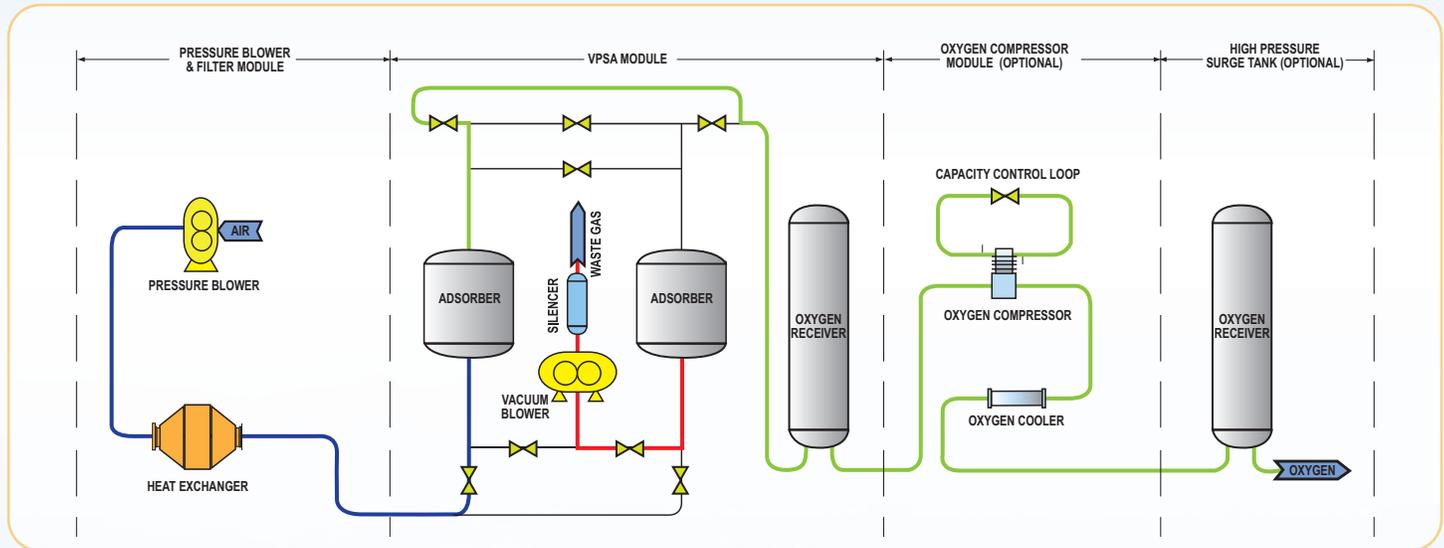
## Feature Benefits to VPSA

AirSep VPSA Oxygen Systems are highly reliable, cost-effective, and offer remote monitoring. AirSep engineers assist with construction, startup, and offer maintenance training. Downloading the stored data is an option for performance evaluation. After the installation, ongoing engineering support is provided at no cost to the customer.



Startup of an ASV27000 VPSA Oxygen Plant at a Wastewater Treatment Facility  
— Rocky Mount, NC USA

## VPSA Plant Schematic – Typical



AirSep VPSA Oxygen Systems with a capacity of 10,000 SCFH and larger, have a guaranteed power consumption of:  
1.03 kWh  $\pm$ 5% per 100 SCFH of total flow, nominal 93% oxygen at 3 psig product pressure at maximum plant capacity at standard conditions.  
.39 kWh  $\pm$ 5% per Nm<sup>3</sup> of total flow, nominal 93% oxygen at .21 barg product pressure at maximum plant capacity.  
Standard conditions 1 atmosphere, 70°F, 0% relative humidity.  
Normal conditions 1 atmosphere, 0°C, 0% relative humidity.  
Note: Specifications subject to change without notice.

## Why Choose AirSep?

**Standard & Custom Designs:** Systems meet customers' application requirements.

**Quality-Assured:** Can be fabricated in accordance with all relevant codes (e.g., ASME, ANSI, CE/PED, CSA, CRN, NEMA).

**Engineering Excellence:** AirSep engineers instrumental in early PSA oxygen research. AirSep leads current PSA and VPSA technology development and refinement. Over 50 patents held worldwide.

**Energy-Efficient:** World's most energy-efficient two-bed PSA and VPSA oxygen processes.  
Generates oxygen on site at less than half the cost of purchased oxygen.

**Safe:** Low pressure operation. Eliminates hazardous handling and storage of purchased liquid or high pressure oxygen.

**Reliable:** Built for years of continuous, trouble-free operation. Eliminates irregular deliveries of purchased oxygen.

**Fully Automatic:** Microprocessor-controlled for unattended operation.

**Practically Maintenance-Free:** Regular maintenance limited to normal compressor or blower upkeep and periodic replacement of oxygen generator filter element(s).



## Supplying Diverse Applications

As a worldwide provider of PSA/VPSA oxygen systems, AirSep supplies equipment for the simplest to the most sophisticated chemical and environmental oxidation processes. Whether at a medical, veterinary, or aquaculture facility, water treatment plant, muffler shop, or in an environmental process, the AirSep name symbolizes diversity.

AirSep excels as the leading supplier of PSA/VPSA oxygen systems — worldwide — offering the most cost-effective, most efficient, and safest oxygen sources for today's diverse oxygen applications.



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