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ON-SITE OXYGEN SOLUTIONS

AUTOMATED MODULAR OXYGEN & NITROGEN GENERATING PLANT 2 & 5 TONS PER DAY PRODUCTION RATES

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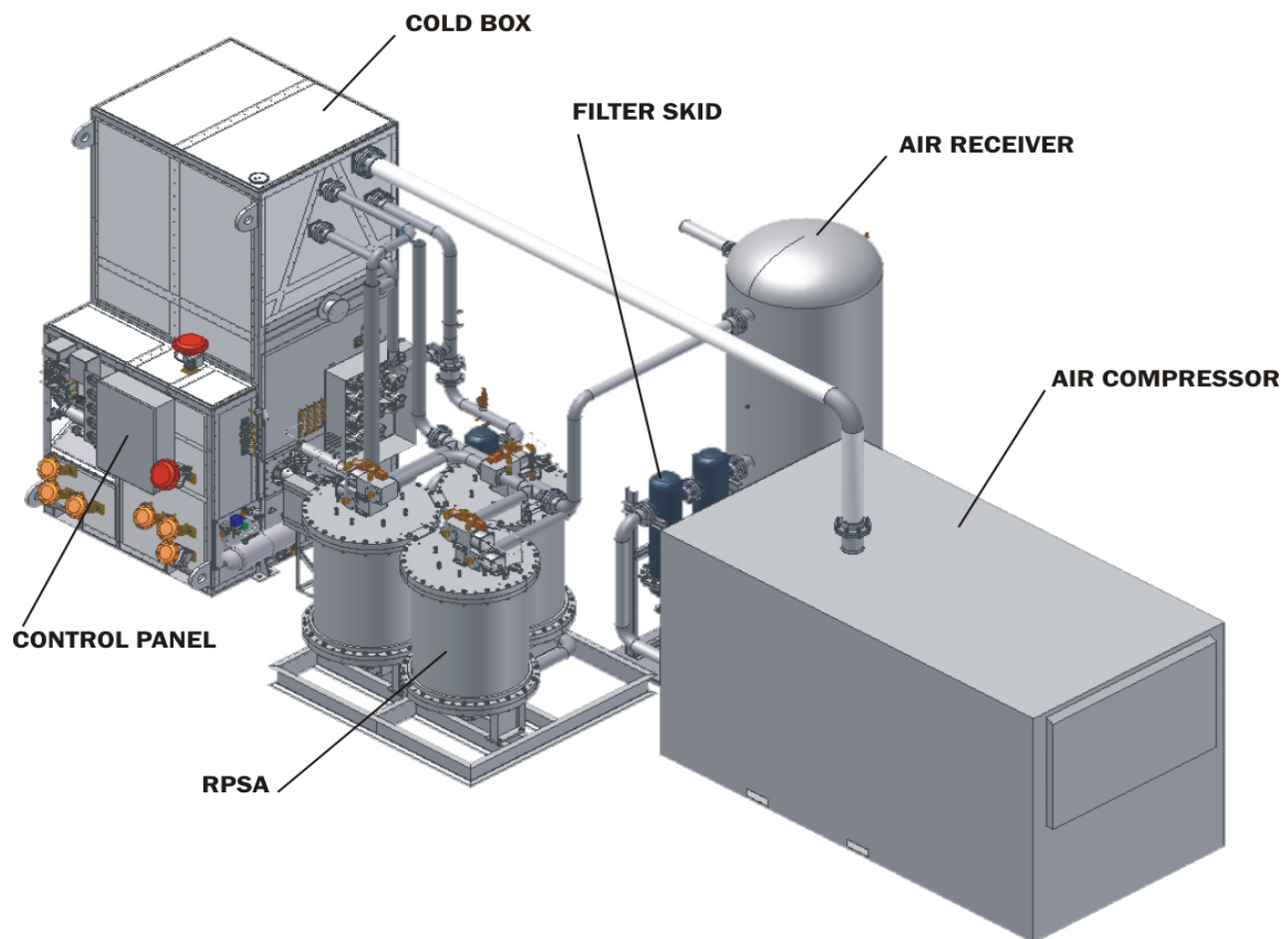


Figure 1 Automated Oxygen and Nitrogen Generating Plant 5 Tons per Day

PURPOSE

The Automated Modular plant produces liquid oxygen or liquid nitrogen to meet various logistical requirements to meet specific customer requirements. The manufacturing process is free of all harmful chemical and biological warfare agents. The plant produces oxygen to meet the requirements of Specification MIL-PRF-27210 and nitrogen to meet the requirements of Federal Specification A-A-59503.

DESCRIPTION

The Oxygen and Nitrogen Generating Plant generates both liquefied oxygen and nitrogen. This system totally eliminates any re-supply requirements or transport of liquid oxygen or liquid nitrogen.

The Oxygen and Nitrogen Generating Plant generates oxygen and nitrogen from ambient air utilizing Rapid Pressure Swing Adsorber (RPSA) technology.

The plant is a completely self-contained, automated unit; it consists of multiple modules providing air compression, purification, heat transfer, refrigeration, rectification and product delivery equipment necessary to produce liquid oxygen or nitrogen, in any combination.

The major modules of the plant in the order of use are as follows:

- Air Compressor (Feedair) Module
- Filter Skid (Air Filtration) Module
- Air Receiver (Buffer) Module
- RPSA (Air Purifier) Module
- Coldbox (Air Separator) Module.

PCI's Modular Plants are mounted on an aluminum skid. The modules have lifting rings and/or forklift slots for handling and installation.

The components of the generating plant are integrated into modules with all components enclosed by panels, with the exception of the RPSA purification Module and Air Receiver Module which are on an open skid. All other major components are readily accessible through panels or removable hatches.

Plant operation is designed to take place within an enclosed building or outside under a canopy. Figure 1 shows the ASU layout.

CAPABILITIES

When installed indoors, the ASU is capable of 30 days continuous production without plant thaw with ambient temperatures of -65°F to 125°F outside of the building. Product delivery rates are listed in Table 1

NOTE

Production capacities listed in Table 1 are for operation at sea level (atmospheric pressure 760 mm Hg) ambient temperature of 70°F, relative humidity of 50%.

FUNCTIONAL DESCRIPTION

The basic functions and flow path through the system are shown in Figure 2. When the ASU is in operation, atmospheric air is drawn in by the Air Compressor System and compressed. The compressed air is passed through the Air Purification System and delivered to the Receiver Tank. The air purification System removes moisture and carbon dioxide from the air flow before the air arrives at the Receiver Tank. The Receiver Tank acts as a buffer and dampening device. From the Receiver Tank the dried and filtered air is delivered to through the Rapid Pressure Swing Adsorber (RPSA) Cycle Control Valves to the RPSA Chambers. The RPSA Control Valves control the length of time any individual chamber is allowed to function removing carbon dioxide and other trace impurities before saturation is reached and the chamber valve cycles to close and open the purge valve to allow the chamber to purge. The cycle is then repeated. The three chambers are individually controlled by dedicated valves for each chamber. Leaving the chambers the dried and filtered air enters the Coldbox. In the Coldbox, the air is divided into a path for air to drive the turboexpander a path for the heat exchanger and purge air from the heat exchanger (turboexpander and heat exchanger not shown). A portion of the bypassed air from the Coldbox is returned to the inlet side of the Air Compressor System.

PRODUCTION CAPACITIES

The generating plant is capable of producing Liquid Oxygen at 99.5% purity or Liquid Nitrogen at 99.5% purity under ambient condition of -20°F to +110°F. Plants are designed to perform at altitudes from sea level; up to 5000 feet.

TPD (short ton)	Oxygen (LOX)	Oxygen (LOX)	Nitrogen (LIN)	Nitrogen (LIN)
2.0 TPD	420 gal	1,589 Liters	592 gal	2,240 Liters
5.0 TPD	1,050 gal	3,974 Liters	1,481gal	5,606 Liters

Table 1 Average Production Rates (at standard conditions), product output of Oxygen or Nitrogen (single product) per 24 hour period.

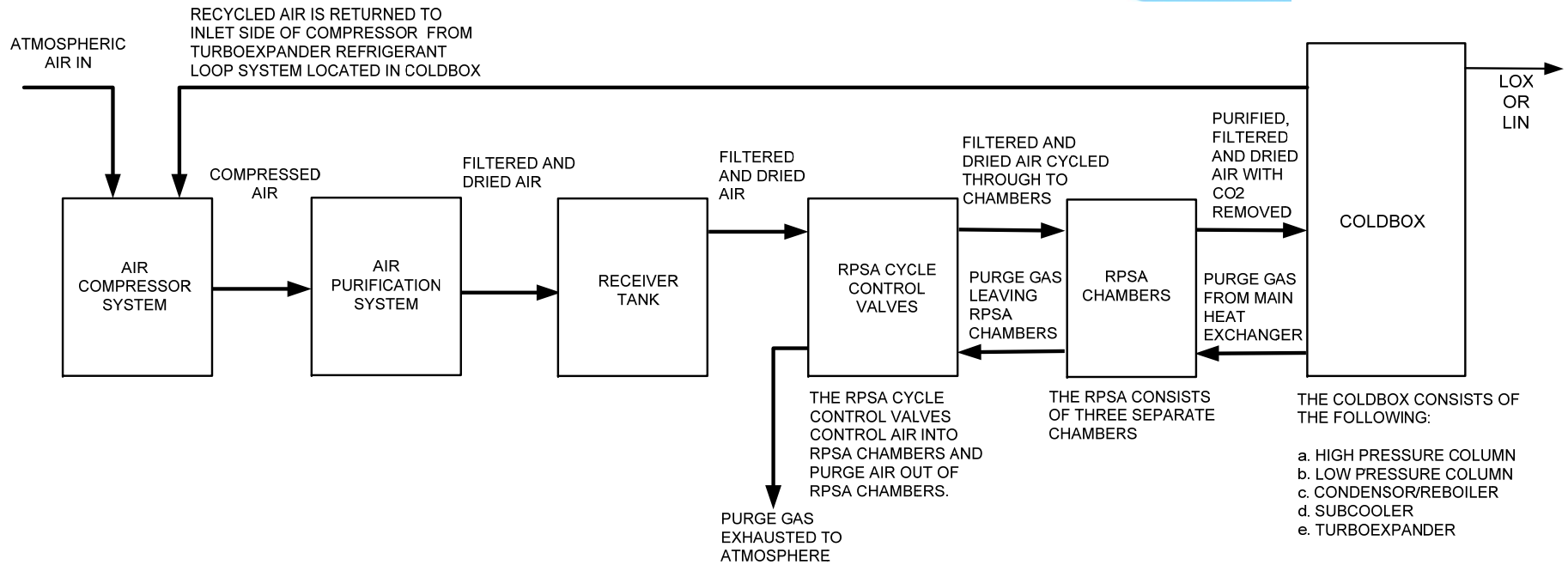


Figure 2 Automated Modular Air Separation Unit Simplified Block Diagram

For more information contact PCI at www.pcigases.com or email us at insidesales@pcigases.com