

## **PRISM® Nitrogen Series Membrane Generators**

Air Products' PRISM® Nitrogen Series Membrane systems provide gaseous nitrogen at flow rates in excess of 800 Nm<sup>3</sup>/hr and nitrogen purities from 95% to 99.9% up to 12.5 barg. product pressure.

These systems can meet a wide range of market needs and are already utilised in the petrochemicals, chemicals, pharmaceuticals, metallurgical, heat treatment, food packaging and processing industries, to name but a few.

### **Technology at work the world over**

These extremely cost-effective nitrogen systems feature a proprietary permeation process developed by Air Products. In our unique process, nitrogen gas is produced using membranes containing the latest state-of-the-art hollow fibre technology. As a leading innovator of this technology Air Products has hundreds of PRISM Series Membrane Systems in operation around the world.

### **A system to suit your application**

Understanding that every application and location is unique, Air Products offers a family of PRISM Series Membrane Systems to meet a wide range of requirements. For each model, internal process parameters can be optimised to meet your specifications for flow, purity and pressure. Engineered for on-site operation, Air Products PRISM Series Membrane Systems are configured with advanced telemetry capabilities for remote monitoring.



*“PRISM Nitrogen Series Membrane Systems meet our customers’ most stringent flow, purity and pressure requirements. We strive to make our low-cost, customized solutions the best overall value in the gas industry.”*

Martin Wallis  
European product manager  
Membrane product line



Air Products has designed, engineered, manufactured and operated on-site gas generation systems for over 60 years, which has created an outstanding global product line.

## Process description

Atmospheric air is compressed in the main air compressor and passed through a series of filters to remove moisture and water/oil vapours.

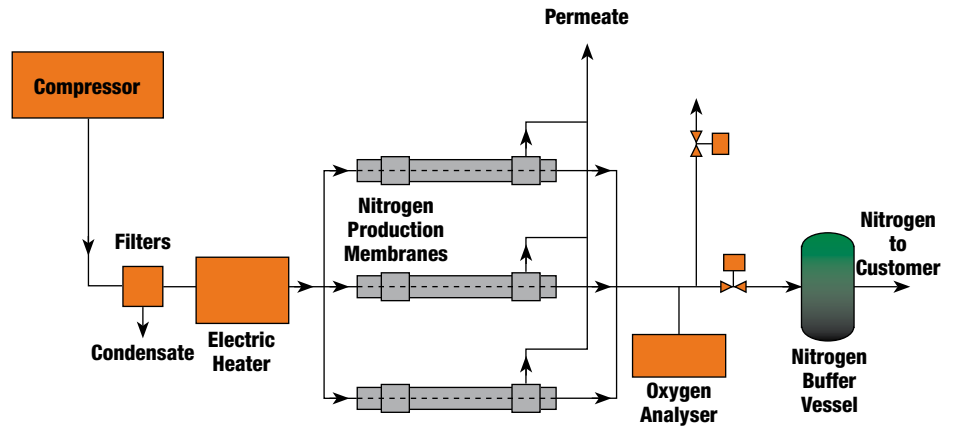
The compressed air is superheated by an electrically powered heater and then enters the membrane modules, where the air separation process takes place.

The compressed air travels through a bundle of hollow fibres. The unwanted oxygen, CO<sub>2</sub>, trace moisture, hydrocarbons and CO present in air permeate in preference to nitrogen.

The waste gas (permeate) is vented safely back to atmosphere at low pressure, whilst the product nitrogen passes through a flow control and non-return valve into the product receiver, or directly into the customer process line.

To enable the machine to operate at sub-zero temperatures, it contains internal electrical frost protection heaters for use in standby mode.

Figure 1 Process flow



## Features and benefits

- Continuous process and no moving parts – the membrane skid has no maintenance intensive moving parts. The membrane separation process is continuous and does not require cycling or flow reversal
- Minimal maintenance – the only scheduled maintenance items on the membrane skid are coalescing filter element cartridges and oxygen analyser cells. Air compressor maintenance is according to manufacturer's standard schedule
- Economics – Significant economic savings are realised by the on-site production of nitrogen from a PRISM membrane system versus cylinder or liquid usage
- Fast start-up – PRISM membrane systems can be brought on-line at specified purity in a matter of minutes after compressed air supply is established
- Simple installation – the membrane packages are compact and relatively lightweight, and do not require special foundations
- Portable – while most land-based applications are relatively permanent, the membrane skids are easy to move to another location, should nitrogen requirements change.
- Ambient temperature flexibility – PRISM membrane systems can be designed to operate at specified performance over a wide range of ambient temperatures
- Versatility – the membrane system may be expanded to meet increased flow requirements by adding more membrane separators
- Supplier experience – we have unparalleled experience in all areas of gas separation using membrane technology

## Options available

### Product N<sub>2</sub> receiver

A product receiver vessel can be specified to meet small peaks and troughs in demand and help maintain a constant product supply pressure.

### Nitrogen back-up

A liquid or gaseous back-up system can also be supplied for systems with very large peaks in product demand, or for processes which cannot tolerate any interruption in nitrogen supply.

### Low pressure

Where the normal product pressure is too high for the customer process or pipework, a pressure reducing and control system can be installed.

## PRISM Series Membrane performance

All PRISM Series Membrane Systems provide nitrogen at purities from 95% to 99.9% and nitrogen pressures up to 12.5 barg.

The S2000 can produce nitrogen at rates of up to 110Nm<sup>3</sup>/hr, the S3000 up to 260Nm<sup>3</sup>/hr and the G5000 in excess of 800Nm<sup>3</sup>/hr.

## Standards and specifications

### Safety, Health and Environment

Air Products believes that nothing is more important than safety.

We have extensive safety management systems, procedures (including HAZOP analysis) and detailed engineering standards, as well as 60 years of air separation plant operation experience.

This expertise is applied to all plant and equipment that Air Products operates and sells, to ensure the safety of employees, customers and the general community. As a result, Air Products is widely acknowledged to be the safety leader in the industrial gas industry and also has one of the leading performances in the chemical industry as a whole.

### Quality

All devices are CE marked and compliant with machinery, low voltage and EMC directives.

### Pressure Vessels

The following codes can be accommodated:

- PED

### Noise

PRISM Series Membrane Systems are designed to meet noise specifications of <85 dB(A) at one metre as standard, in free field area with no other noise source. Lower noise specification can be achieved with the use of additional acoustic screens or devices.

Figure 2 Membrane performance map

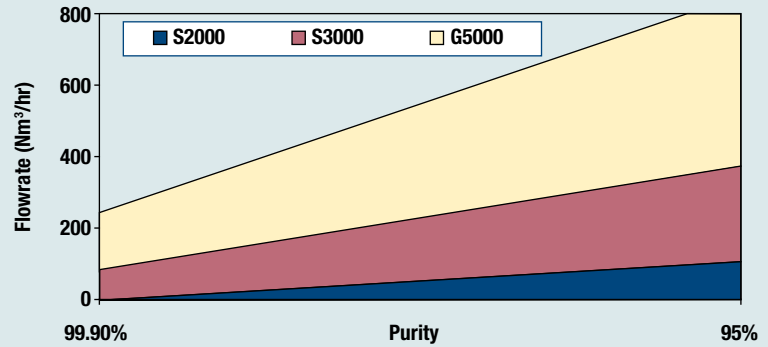
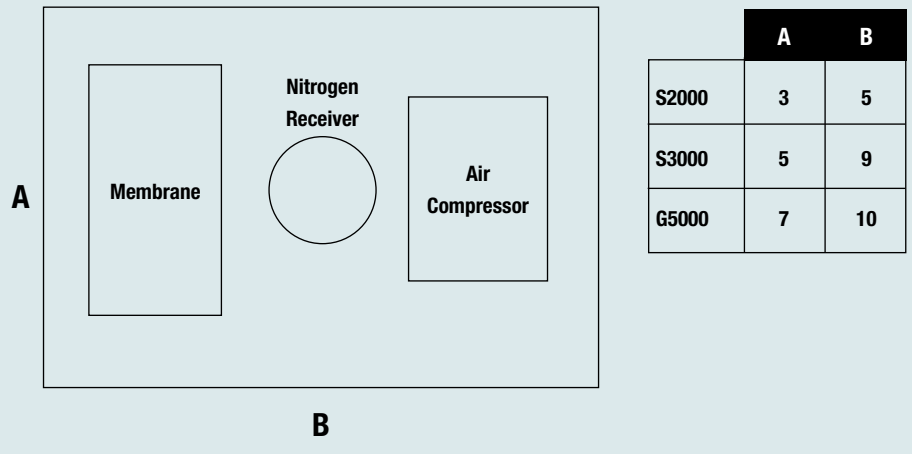


Figure 3 – Typical plot space requirements in metres (indicative only)



### *About Air Products*

Air Products touches the lives of consumers around the globe in positive ways every day. We serve customers in healthcare, technology, energy, and industrial markets worldwide with a unique portfolio of products, services and solutions, providing atmospheric gases, process and specialty gases, performance materials and chemical intermediates. The company has built leading positions in key growth markets, such as semiconductor materials, refinery hydrogen, home healthcare services, natural gas liquefaction, and advanced coatings and adhesives.

### *Over 60 years of growth*

Air Products was established in 1940 in Detroit, Michigan, on the strength of a simple, but then revolutionary, idea: the "on-site" concept of producing and selling industrial gases, primarily oxygen. At the time, most oxygen was sold as a highly compressed gas product in cylinders that weighed five times more than the gas itself. Air Products proposed building oxygen gas generating facilities adjacent to large-volume users, thereby reducing distribution costs. The concept of piping the gas directly from the generator to the point of use proved sound and technically solvable.

Founded more than 60 years ago, Air Products is recognized for its innovative culture, operational excellence and commitment to safety and the environment. In fact, we are the safest company of our kind in the nation. With annual revenues of \$8.1 billion and operations in more than 30 countries, more than 20,000 Air Products employees build lasting relationships with their customers and communities based on understanding, integrity and passion.

### *For more information*

To learn more about our global gas generation capabilities or to tell us more about your needs, contact the office nearest you. Or visit us on the Web at [www.airproducts.co.uk/prism](http://www.airproducts.co.uk/prism).

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