

PRISM[®] Cryogenic Nitrogen Generators — TN Series

Reliable on-site supply

Delivering performance

For applications requiring large volumes of gaseous nitrogen, Air Products' PRISM TN Nitrogen Generators provide cost-effective supply with reliability, safety and efficiency. Our generators deliver gaseous nitrogen at flow rates up to 55,000 Nm³/hour at pressure up to 10 bar without product compression. While purity levels of less than 5 ppm oxygen in nitrogen are standard, the system's flexibility is able to achieve higher purities up to less than 100 ppb of oxygen in nitrogen.

Utilizing a flexible platform of pre-engineered modules, Air Products can customize a plant for your application which is simple and economical to build, operate and maintain. Specific benefits of the PRISM TN Nitrogen Generator systems include:



Features/benefits

Cost-effective

- Standard pre-engineered plant range
- Single distillation column with Air Products proprietary structured packing
- Skidded for low installation costs and reduced space requirements.
- Fully automatic controls for unmanned operation resulting in low manning costs
- Remote operation can be provided

High Reliability

- Single, integrally geared turbo air compressor
- Efficient adsorber system eliminates the need for any mechanical chiller unit
- Integrated instrument air system

Low Operating Costs

- Proprietary column packing results in low air/nitrogen ratio
- Low pressure option with product compression gives low power consumption

Flexibility

- Customer has options to best fit their requirements
- Multiple design and operating options
- Can be customized to meet client specifications

Automation

- Remote operation
- Minimal site manning
- Reduced operation costs

Applications

At locations around the world, our PRISM TN Nitrogen Generators are supplying a broad range of industries. This diversity has driven us to develop a standardized product family with features that can be customized to meet the requirements of your application.

Whether you are in the electronics industry looking for ppb purity levels or need production flexibility for your petroleum industry application, our PRISM Nitrogen Generators can meet your needs. Here are just a few examples of how you can customize the system for your operation:

- High-efficiency operation using low pressure plant operation
- Ultra-high purity to <100 ppb O2 for the electronics industry and CDA (Clean Dry Air)
- Variety of cooling water packages: Closed loop, open tower or air cooled options
- Control by integrated PLC (Programmable Logic Controller) or directly by client Distributed Control System
- Higher pressure supplied by product compression
- Installation and start-up by Air Products or FOB supply only. We can own and operate the plant under a sale of gas agreement and also can sell the plant to the customer if they wish to operate.
- Secondary expander for additional liquid nitrogen production
- Ultra-high purity liquid oxygen production

Figure 1: Typical Plant Layout

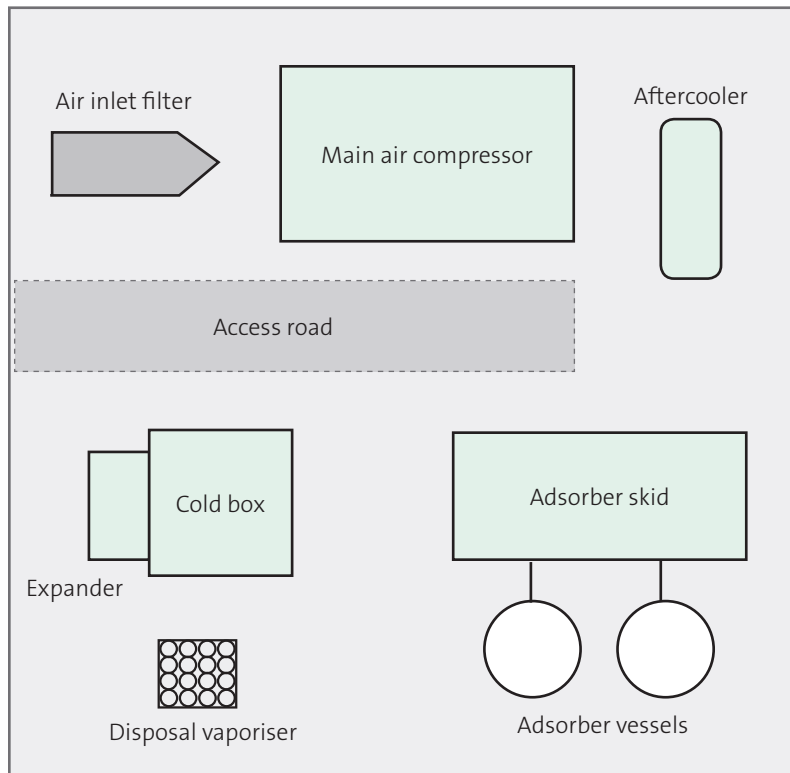
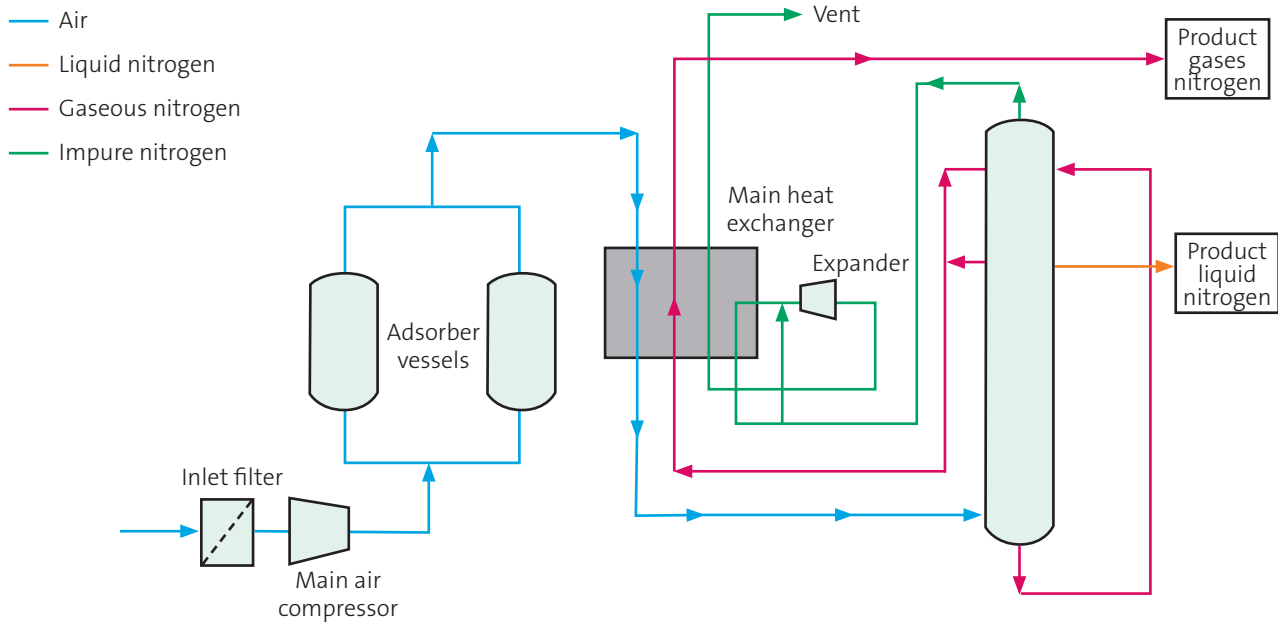


Figure 2: Process Flow Diagram



Process description

1. Filtered atmospheric air is compressed in the main air compressor, then cooled.
2. A two-bed adsorption system removes moisture, carbon dioxide and heavy hydrocarbons. The beds alternate between use and regeneration, with regeneration achieved with dry waste air from the plant.
3. The dry air from the adsorbers enters the cold box, and is cooled to near dew point. Cold air then goes to the high pressure (HP) column where it is separated into pure nitrogen gas and oxygen enriched liquid.
4. The nitrogen gas leaves the top of the HP column to go to either the reboiler for condensation, returned to the HP column as reflux, or sub-cooled and sent part to the low pressure (LP) column as liquid nitrogen (LIN) reflux and part to be stored as LIN. The oxygen enriched fraction is flashed into the LP column as crude reflux.
5. Final distillation is in the LP column, with the top nitrogen at product purity. Waste gas and waste liquid separation occurs in the reboiler. A continuous purge of oxygen enriched liquid is removed from the reboiler sump to prevent buildup of hydrocarbons and carbon dioxide.
6. Refrigeration for the overall process comes from the expansion of the waste gas to capture the temperature drop. This cold air cools the incoming air in the main heat exchanger as well as regenerating the adsorbers.
7. Pure gaseous nitrogen from the top of the LP column is heated to near ambient temperatures prior to leaving the cold box. It is combined with any makeup gas from storage before leaving the plant for your application.

Our commitment to you

As a recognized safety leader in the industry, nothing is more important to us than safety, health and the environment. The expertise we have gained from over 80 years of air separation plant operation goes into every plant and piece of equipment we build, sell or operate.

Additionally, on-site gas generation helps sustainability-minded customers reduce their carbon footprint. It reduces the transportation of delivered products and makes the molecule directly as a gas thereby avoiding the energy needed for liquefaction. And our technology and engineering teams are constantly working to provide even higher levels of energy efficiency in our on-site gas generators.



Our plants are certified to ISO 9001 guidelines with ASME B31.3 piping standard. Pressure vessels are designed to ASME VIII guidelines or regional variation such as European PED where needed. Standard electrics are ICE, CE plated and NEMA where required. While our standard noise level is 85 dB (A) at one meter in a free field area, with other noise sources not accounted, lower levels can also be realized.

Global experience—local expertise

With local expertise around the world, Air Products can deliver reliable, cost-effective gas supply solutions by working with you to understand your needs. You can explore your gas supply options at: www.airproducts.com/gasgeneration or contact your local office below to see how we can help you.

We welcome the opportunity to have a discussion with you. Please contact us at any of these locations:

Corporate Headquarters

Air Products and Chemicals, Inc.
7201 Hamilton Boulevard
Allentown, PA 18195-1501
T 800-654-4567
T 610-481-4911
F 800-272-4449
F 610-706-7394

Europe

Air Products PLC
Hersham Place Technology Park
Molesey Road
Walton-on-Thames Surrey KT12 4RZ
UK
T +44-1932-249200
F +44-1932-259367

Latin America and South Africa

Air Products and Chemicals, Inc.
7201 Hamilton Boulevard
Allentown, PA 18195-1501
T +1-610-481-4911
F +1-610-706-8782

Asia

Air Products and Chemicals (China) Investment Co. Ltd.
East Wing, Floor 1 Building #88
Lane 887 Zu Chongzhi Road
Zhangjiang Hi-Tech Park Shanghai, 201203
P.R. China
T +86-21-38962000
F +86-21-50803333
asiagg@airproducts.com



tell me more
airproducts.com/gasgeneration