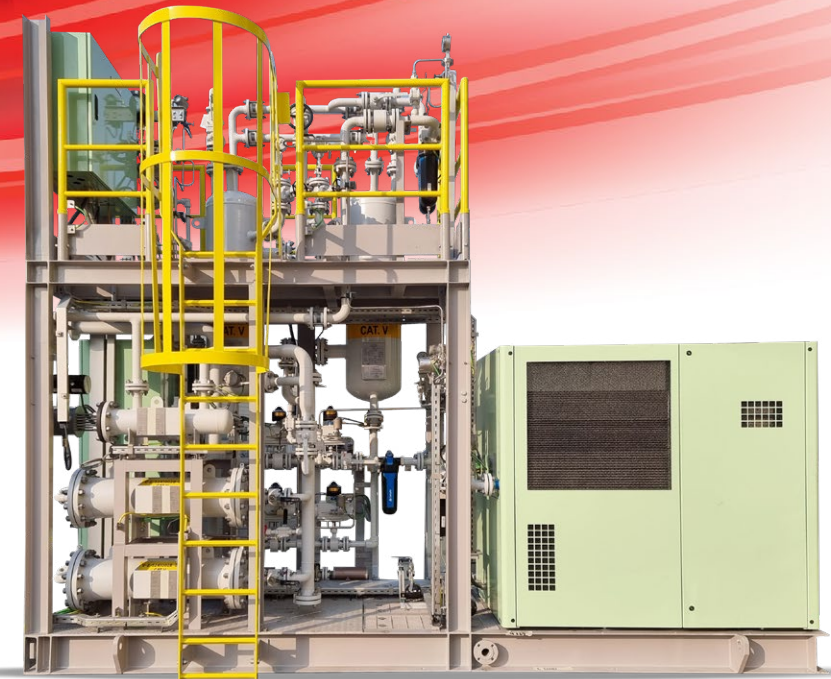




ENGINEERED NITROGEN GENERATION PACKAGES

LEAD SUCCESSFUL PROJECTS WITH MAXIMUM SAFETY & EFFICIENCY LEVELS

Thanks to our dedicated project management team, we help our customers successfully manage and implement the most challenging engineered nitrogen generation packages with confidence.



Engineered Systems and Services
www.ingersollrand.com/en/project-solutions

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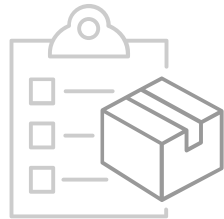
01. Ingersoll Rand Introduction

At Ingersoll Rand we have been managing and implementing engineered to-order air packages for complex technical requirements for **over 60 years**.

We provide **specialized custom compressed air and nitrogen generation packages to international EPC contractors and engineering companies** across a range of industries.

Using the extensive experience that we have gained by working with EPC companies, we have developed the capability to carry our complex projects that are tailored to our customers' requirements. Engineered for performance, our range of equipment is built to provide **maximum efficiency, reliability and uptime**.

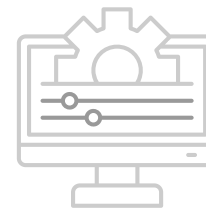
We are a leading global business provider, offering custom-made products to satisfy a range of customer needs based on:



Market to Order
(MTO)



Engineering to Order
(ETO)



Special configuration and Project
Lifecycle Support (PLS)
for complex projects
and EPC contractors.

02. Nitrogen Generation Packages Applications

Our custom-designed nitrogen generation packages are mainly supplied for applications in the oil & gas, power generation, chemical, and mining industries. Our experience covers installations at desert and arctic ambient conditions, as well as in classified areas.

Oil & Gas	Power Plants	Chemical & Petrochemical	Mining
• Reduction of fire and explosion risk, as well as unwanted oxidation • Conveying within piping systems • Keeping pipelines clear • Tank ventilation • Purging of controls panels • Flare gas inerting • Dry gas sealing • Tank blanketing	• Dry gas compressor and gas turbine sealing • Inerting of HRSG (heat recovery steam generator) • Protection against corrosion on the inner walls of wetted parts, condensers and boiler tubs • Purging of natural gas and ammonia	• Fire prevention • Explosion prevention • Blanketing of oxygen-sensitive compounds (chemicals) • Pipeline purging • Pressure transfer of liquids • Pressure testing • Pneumatic transport	• Extinguishing of coal mine fires • Inerting of sulfuric acid plants for heap leaching • Inerting of abandoned mine areas • Purging of LPG lines in copper / nickel / uranium mines
Pressure Swing Adsorption (PSA) System Packages  Membrane System Packages 			
OTHER PRODUCTS: Air compressors Air dryers Nitrogen booster compressors Nitrogen bottles			



03. Pressure Swing Adsorption (PSA) System Packages

PSA (pressure swing adsorption) is a technology used for air separation to enable the creation of a continuous stream of nitrogen by means of selective adsorption. Ingersoll Rand nitrogen generators use Pressure Swing Adsorption (PSA) technology to separate nitrogen molecules from other molecules found in compressed air. Oxygen and other trace gases are removed, while nitrogen is allowed to pass through to the application.

The design and control features employed by nitrogen generators help maximize gas output and **reduce air consumption to achieve efficiency.**

The Ingersoll Rand Series can be configured to suit installations for everyday supply of nitrogen and when nitrogen demand increases. Additional modules can provide extra capacity on standby or serve as backup for peace of mind. PSA Nitrogen Generation Packages can be supplied inside a shelter, on skids, or turn-key installed inside ISO and other standard freight containers. All components will be selected based on the local ambient conditions and the area classification of the installation site.

Ingersoll Rand is able to provide nitrogen packages for any customer-specific requirement. We can customize the PSA package to your needs.

TECHNICAL DATA

- | | |
|---------------------------------|--------------------------------|
| • N ₂ Flow Capacity: | Max. 1,800 Nm ³ /hr |
| • N ₂ Purity: | 99,999% |

Oil & Gas	Power Plants
Chemical & Petrochemical	Mining



Compact
space-saving
design



Flexible modular
design



Low cost
of ownership



Reliable



Highest purity
up to 99,9%



Lowest Energy
Consumption



Operate in Extreme High
and/or Low
Ambient Temperatures



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04. Membrane System Packages

Membrane Nitrogen Generation Systems consist of fibrous membrane modules arranged in a convenient housing equipped with a control system and integral filtration. High-quality compressed air can be separated by means of membranes composed of small, hollow polymer fibers. In the permeation process, dried and cleaned compressed air (<+5°C pdp) that enters these fiber walls is filtered of water vapor, CO₂, and oxygen. At the same time, residual gas (mainly nitrogen) goes along the fibers and is collected as a product of the process.

The membranes are designed to remove unwanted gases such, as oxygen and water vapor, through the hollow fiber wall and out to the atmosphere while retaining nitrogen. This nitrogen product flows continuously through to the application.

The intake air should be correctly cleaned and dried before it enters the membrane. If not, the shallow fibers will quickly clog. Air treatment through filters and dryers is necessary to avoid clogging.

Our membrane nitrogen generation systems can be supplied inside a shelter, on skids, or turn-key installed inside an ISO and other standard freight containers. All components will be selected based on the local ambient conditions and area classification.

We are able to provide membrane nitrogen generation systems for any customer-specific requirement.

TECHNICAL DATA

- N₂ Flow Capacity: Max. 3,000 Nm³/hr
- N₂ Purity: 99%

Oil & Gas	Power Plants
Chemical & Petrochemical	Mining



High Efficiency



Stable Flow



Very low
noise level



Highest purity
up to 99.9%



Easy
Maintenance



Simple
Installation



Operate in Extreme High
and/or Low
Ambient Temperatures



[READ MORE](#)



05. Choosing Between a PSA and Membrane Systems

Ingersoll Rand PSA and membrane systems offer unique benefits and value. Many more factors outside of pressure, flow, and purity affect the ultimate choice of a generator. Ease of installation, special customer requirements, location, and application, are only a few of the other considerations. In general, membrane technology is better suited to low purity applications while PSA technology is best suited for higher purity and capacity applications. If required, our qualified engineers can assist in the selection of a suitable solution for your application.

	PSA	Membrane
Achievable Purity	Very high purity	High purity
Efficiency	Higher	High
Differential Pressure	1.5~2 bar	1~1.5 bar
Flow Stability	Fluctuating in/on/outlet	Stable
Buffer tank required	Surge air receiver and nitrogen mixing vessel required	No
Noise	High (blow-off peaks)	Low noise operation
Control type	PLC, Auto control	PLC, Auto Control
Inlet temperature	Operation to 60 deg.C	Operation to 60 deg.C
Start-up time	Minutes / hours	Seconds
Weight	Medium	Low
Maintenance	Low	Lower
Moving parts	Frequently change over of valves	No required

06. A dedicated project management team for your peace of mind

At Ingersoll Rand Engineering Solutions, we have a dedicated team of expert engineers who provide **full project management support** from the design phase, to construction, commissioning and aftermarket service support.

Our project management team has the knowhow as a result of managing and implementing hundreds of projects with leading EPC (Engineering, Procurement and Construction) and engineering companies.

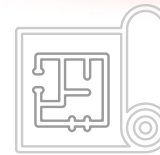
Our expert engineers and project managers **deliver on time technical & quality documentation**. We know how to help our clients proceed smoothly through the entire process.



Support during
the whole project



Highly engineered
to technical
requirements



Complete technical and quality
documentation: sectional
drawing and 3D modelling.



Honesty
and transparency

Ingersoll Rand Engineered Solutions supports you throughout the project lifecycle



*Engineering, Procurement and Construction

07. Customer Stories

Ensuring continued and maximum nitrogen performance levels

- EPC contractor: World's leading EPC&PM company.
- End user customer: Saudi Arabia company.
- Location: Saudi Arabia.
- Product: 2 lubricated air compressors, 2 refrigeration air dryers, 2 Nitrogen PSA Package, 2 Chiller systems (Closed loop water), LP Booster (40 Bar) + HP Booster (300 bar) Thirty (30) racks of 16 bottles each of Nitrogen bottles (300 bar).
- Application: Blanketing of Thermal Oil Tanks.

Customer Benefits:

- One shop for the entire project.
- Complete project handled by a single project management team.
- Ease of operations through a common control system.
- Continuous 24x7 production with a backup system using N2 bottle racks
- NO dependency on external nitrogen Supply.



Securing the nitrogen project ahead of the planned delivery time

- EPC contractor: World's leading EPC&PM company.
- End user customer: leading Oil & Energy company.
- Location: Dubai.
- Product: Instrument air system: 2 oil injected screw compressors, air-filters, 2 heatless desiccant dryers, master control panel (PLC Based) and combined skid. Nitrogen generation package: 2 oil Injected screw compressors, 2 refrigeration dryers, 1 buffer receiver (ASME), 2 nitrogen generator (PSA) + master control panel (PLC Based) and combined skid.
- Application: sealing gas for gas compressors.

Customer Benefits:

- Delivery ahead of schedule.
- Separate systems from a single supplier.
- Self-sufficient in on-site N2 gas production.
- Plug-and-play solution. Our air and nitrogen systems are designed for easy installation and operation. Once power and piping are connected, it is ready to use.
- System drawings & documents as per end user requirement.

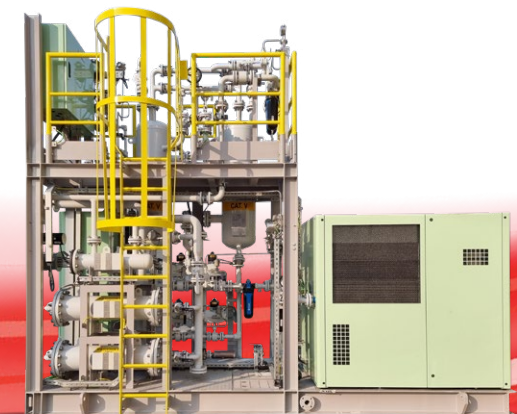


Ensuring maximum safety levels in offshore harsh conditions

- EPC contractor: World's leading EPC&PM company.
- End user customer: Brazilian oil company.
- Location: Brazil.
- Product: 2 lubricated air compressors, heatless desiccant type air dryer & Nitrogen Membrane Package.
- Application: Supply of instrument air, high purity nitrogen for offshore platform.

Customer Benefits:

- Full containerized solution, extremely low ambient temp accommodated with heating and auto ventilation.
- Full compliance with customer's requirements.
- Zone II certified instrument.
- Explosion-proof instrumentation, PLC based LCP.



08. Highest Quality Standards

The safety and integrity of our customers' operations are our top priority. We engineered our nitrogen generation packages to the **highest levels of quality**, which helps our customers not only to meet demanding technical requirements but also to avoid safety hazards, prevent equipment failures, and ensure efficient operations. This can ultimately lead to increased productivity, reduced downtime, and improved profitability for our customers.

Ingersoll Rand has an extensive quality certificates list, issued by different institutions worldwide. We continually optimize our management systems to supply our customers with high-quality products, service, and solutions tailored to their individual needs.



Standards Applied to Ingersoll Rand Engineered Nitrogen Generation Packages

- Areas & Temperatures
- Hazardous area (Zone 1/2 or Class 1 div. 2)
- Extreme ambient temperatures Quality International and Local Standards, i.e.:
 - API 619
 - ISO 10440-1
 - ISO 10440-2
 - ATEX
 - API R14
 - EN 60034
 - ASME VIII DIV. 1 AND U STAMP
 - PED



09. Service support. Aftermarket

Ingersoll Rand provides a **comprehensive line of maintenance programs to help our customers increase** cost-effectively and at optimum performance.

We have a comprehensive global network of strategically located manufacturing facilities, sales offices, and authorized service centers. This allows us to **think globally and act locally**, providing service and support to our customers where and when they need it.

We offer a comprehensive portfolio of maintenance service packages and programs that include:



Inventory checks and equipment audits



Pre-commissioning activities



Commissioning and start-up



Site trainings



Genuine spare parts



Preventive and corrective maintenance



Performance and reliability upgrades,
post-upgrades of the customer's machines





10. Engineered Systems and Services (ESS)

Ingersoll Rand's Engineered Systems and Services (ESS) is dedicated business line to providing market-leading, **custom-engineered solutions**.

Formed from a merger of three renowned business units - Ingersoll Rand Air & Gas Solutions, Ingersoll Rand Engineering Project Solutions, and K. LUND Offshore - Ingersoll Rand Engineered Systems and Services (ESS) leverages extensive experience to serve Engineering, Procurement, and Construction (EPCs) contractors and other firms in need of specialized engineering Services.

With a portfolio that includes state-of-the-art **air and gas compressors, dryers, nitrogen generators, and gas recovery Systems**, Ingersoll Rand Engineered Systems and Services (ESS) is committed to pioneering innovation and maintaining the highest standards of engineering excellence. We pride ourselves on managing intricate projects across the globe, employing cutting edge technology to drive the success of our customers.

11. Our Manufacturing Facilities

Ingersoll Rand Spain

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6200

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India
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