



Nitrogen stations, Self-Propelled Nitrogen Compressor Stations



About Company

Market leader

GRASYS is one of the Europe largest engineering companies involved in development and manufacture of state-of-the-art equipment for process gases production and gaseous media handling.

GRASYS produces a wide range of modern stationary and self-propelled gas media separation systems thus offering a custom-made engineering solution for each customer task.

Competence

GRASYS self-propelled and stationary units designated for gas production and separation are the most up-to-date and efficient gas separation systems highly recognized in Russia, the CIS and other world regions.

Among Company customers are more than 300 major and widely known enterprises. GRASYS products are used by such companies as Gazprom, Rosneft, Shell, Exxon Mobil, NOVATEK, TNK-BP, Lukoil, Slavneft, Gazprom Neft, Surgutneftegaz, RITEK.

Nitrogen stations, self-propelled nitrogen compressor stations

GRASYS produces membrane nitrogen stations – stationary and self-propelled systems for high and low pressure nitrogen production from air. Leveraging the advanced technologies and its extensive experience in the field of gas separation, GRASYS has developed and brought onstream new-generation nitrogen compressor stations. Technically, GRASYS nitrogen complexes are highly efficient systems for nitrogen recovery from air designed for use under the harshest operating and climatic conditions.

Production

GRASYS pays special attention to quality of its products. Company equipment is manufactured at the plants affiliated with the Defense Enterprises Association. All manufacture stages are subject to rigid control both with regard to quality of materials and components used and quality of assemblies fabricated at each manufacture and assembly stage.

For each plant, the «Permission for Use» is issued by the Federal Service for Environmental, Technological and Nuclear Supervision (Rostekhnadzor).

Technologies

GRASYS conducts its scientific research and engineering development activities on the basis of the specialized laboratories of the Russian Research Centre Kurchatov Institute. GRASYS designs and manufactures its equipment in cooperation with the leading western companies engaged in process gases separation.



Applications

Oil and gas pipelines purging and pressure testing

Nitrogen is used for pipelines cleaning and purging to ensure explosion and fire safety during transportation of natural gas, oil and oil products. Utilizing nitrogen for pressurization of pipelines guarantees absolute safety of works.

Oil and gas pipelines and equipment drying

After a number of technological operations, certain assemblies and pipeline sections may contain water which is utterly undesirable. Dry nitrogen in which the vaporization process undergoes very intensively is effectively applied for water removal.

Nitrogen fire extinguishing

Nitrogen allows effectively preventing fire and explosion hazardous situations at oil and gas production facilities as well as in shafts in the process of coal mining.

Well drilling

High-pressure nitrogen is used in coil tubing operations – coiled tubing drilling. This

technology allows increasing well drilling rates several times, reducing header damage and eliminating the possibility of explosions and fire outbreaks.

Well workover

In workover operations, nitrogen is used for explosion and fire safety assurance, mostly as foam solutions. The use of nitrogen allows guaranteeing operating safety and reducing workover time and the number of required technological operations.

Well stimulation, cementing

Nitrogen is intensively used in operations associated with well stimulation. Inert properties of nitrogen are essential during foam or acid treatment and gas lift, thus allowing to utilize its energy in a compressed state. In well cementing operations, nitrogen is used for mixing up low-density slurries.

GPF, CS and BCS equipment purging

Nitrogen is used for purging various process equipment at oil and gas processing facilities (GPF), compressor stations (CS), BCS (booster compressor stations) etc.

Nitrogen blanketing of tanks

Nitrogen stations find use for tank blanketing with gaseous nitrogen, at both high and low pressures.

Mobile nitrogen stations

Advantages of GRASYS nitrogen stations:

- Enhanced mobility
- Complete self-supportability in diesel version
- Exceptional reliability
- Complete automation and improved serviceability
- No manned operation required
- Moderate dimensions and light weight
- Low cost of nitrogen produced
- Quick system start-up and shutoff
- Operating ability over a wide temperature range
- No special requirements to air quality
- Low operating costs
- Extended operational life

The ideal solution for remote locations

Product nitrogen specifications

Purity, %	90 – 99.5
Capacity, nm ³ /hr*	5 – 5000
Pressure, barg	5 – 40
Dew point, °C	-40 – -60

Ambient temperature

during operation, °C	-45 – +40
during storage, °C	-60 – +50

Warm-up period, min
(depending on nitrogen concentration)

Membrane modules operational life, ths. hrs**	100 – 150
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* Capacity is referenced to normal conditions (t=20 °C, P=1 atm)

** Depending on the compressor type and subject to compliance with operating requirements







Customer: Salym Petroleum Development N.V.
Capacity – 500 nm³/hr, nitrogen purity – 96%

Mobile nitrogen stations

GRASYS mobile nitrogen stations came as a real technological breakthrough in the field of manufacture of high-capacity, simple in operation and exceptionally reliable mobile systems for nitrogen production from air.

The minimal weight and dimensional characteristics of gas separation units and their improved vibration stability allowed equipment installation on a single platform with compressor. Before this,

no Russian company had managed to design a nitrogen station working on this principle.

Specially designed and manufactured for field operation mobile nitrogen stations are self-supporting containerized systems for nitrogen production from atmospheric air. On customer request, nitrogen station may be provided in the trailer, skid or self-propelled version. Mobile nitrogen stations are designed to produce 90 to 99.5% nitrogen at the rate of 5 to 5,000 nm³/hr. Mobile nitrogen stations consist of a compressor driven by a diesel or electric motor, air preparation unit, gas separation unit and a control system.

Nitrogen parameters at the plant output				Warm-up period, min., max	Ambient air temperature during operation, °C
Purity, %	Capacity, nm ³ /hr*	Pressure, barg	Dew point, °C		
90 – 99.5	5 – 5000	5 – 40	-40 – -60	10 – 20**	-45 – +40

* Capacity is referenced to normal conditions (t=20 °C, P=1 atm).
** Depending on nitrogen concentration



Customer: OJSC Gazprom
Capacity – 180 nm³/hr, nitrogen purity – 95%

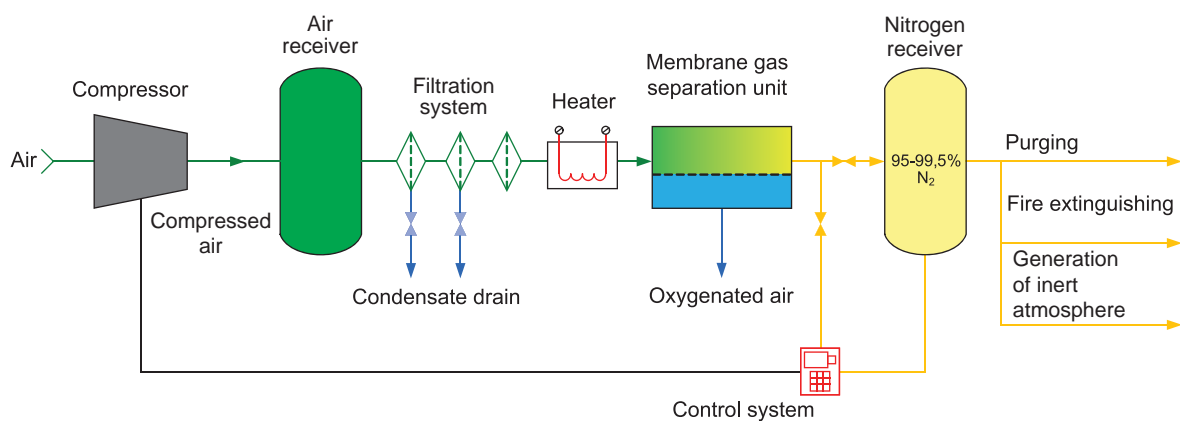
Mobile nitrogen stations

Nitrogen stations, as well as nitrogen plants, are completely automated providing for automatic control of all operating parameters and require no immediate operator involvement. Due to the exceptional reliability and high efficiency, all air separation mobile systems currently manufactured worldwide are based on membrane technology.

The combination of innovative technologies and the long-term experience allows guaranteeing the top quality of the produced air separation stations meeting the highest world standards and proof-tested under harsh conditions of Siberia and the Far North.

Mobile nitrogen production stations are designated for generation of inert nitrogen environment from atmospheric air for explosion and fire safety assurance at chemical, petrochemical and petroleum plants.

Mobile nitrogen station flow process diagram



Self-propelled nitrogen compressor stations

Advantages of GRASYS nitrogen compressor stations:

- Mobility, enhanced off-road capacity
- Exceptional operating reliability
- Quick system start-up and shutoff
- Operating ability over a wide temperature range
- No special requirements to air quality
- Equipment installation on a single platform
- Simple operation and maintenance
- Low operating costs
- High and low-pressure nitrogen delivery options
- Nitrogen delivery option at constant pressure: high or low

The mobile solution for a self-contained nitrogen production unit

Product nitrogen specifications

Purity, %	90 – 99.5
Capacity, nm ³ /min*	2.5 – 36
Pressure, barg	1 – 350
Dew point, °C	-40 – -60

Ambient temperature

during operation, °C	-45 – +40
during storage, °C	-60 – +50

Warm-up period, min	15 – 30
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Skid-mounted version, KAMAZ, URAL undercarriage etc

* Capacity is referenced to normal conditions (t=20 °C, P=1 atm)







Customer: Kazakhoil Aktobe LLP

Capacity – 7.5 nm³/min, nitrogen purity – 95%, product nitrogen pressure – up to 350 barg

Self-propelled nitrogen compressor stations

In the course of development of its nitrogen station systems, GRASYS took into account many recommendations of operating divisions of oil and gas companies. This enabled the launch of new-generation nitrogen compressor stations which fundamentally differ from their existing counterparts in Russia CIS. GRASYS stations allow in a few minutes starting nitrogen production from atmospheric air, while their mobility makes them indispensable in remote areas.

The new-generation nitrogen compressor stations made by GRASYS are designed

to produce nitrogen at either pressure required by customer: low or high. Stations may also be configured to produce both low and high-pressure nitrogen with its parameters adjusted according to process requirements.

Self-propelled nitrogen compressor stations are recommended by RF Rostekhnadzor for use in drilling, completion, workover and operation of oil and gas wells, opening of pay formation, repair and testing of pipelines and vessels in oil and gas industry (PB 08-624-03. Safety Rules for Oil and Gas Industry).

GRASYS undertakes the design and manufacture of all principal station units as well as their assembly and testing which enables it to guarantee perfect quality of its equipment.

Nitrogen parameters at the plant output				Warm-up period, min., max	Ambient air temperature during operation, °C
Purity, %	Capacity, nm ³ /min*	Pressure, barg	Dew point, °C		
90 – 99.5	2.5 – 36	1 – 350	-40 – -60	30	-45 – +40

* Capacity is referenced to normal conditions (t=20 °C, P=1 atm).



Customer: OJSC Gazprom
Capacity – 600 nm³/hr, nitrogen purity – 95%

Self-propelled nitrogen compressor stations

GRASYS nitrogen compressor stations are offered in the containerized, skid or trailer-mounted version or in the self-propelled version on KAMAZ or URAL chassis. Moderate dimensions of nitrogen compressor stations and their enhanced mobility make it possible to promptly deliver stations to the facilities where there is a current need for nitrogen.

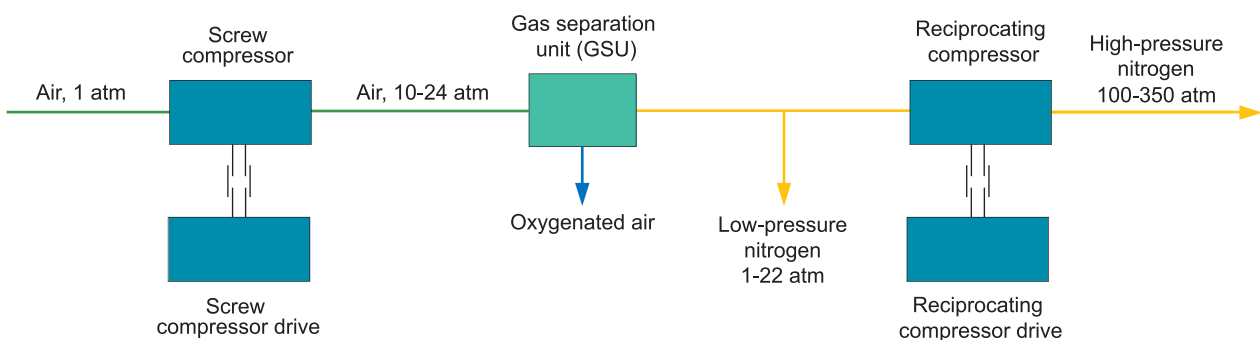
Structurally, a nitrogen compressor station is a self-contained unit consisting

of a gas separation unit, air purifier, control unit, air and booster compressors mounted on chassis or a transportable frame. All station equipment is installed in a metal enclosure or a standard container.

Station control is ultimately simplified and automated. Station start-up and shutoff are enabled by a few buttons thus allowing the involvement of personnel unaccustomed with nitrogen stations.

In the case of a truck-mounted station, its operation and control are arranged directly from the driver's cabin which is very convenient and especially important in adverse climate regions.

Nitrogen compressor station flow process diagram



GRASYS products:

- Nitrogen plants and stations
 - Membrane nitrogen plants
 - Adsorption nitrogen plants
 - Cryogenic nitrogen plants
 - Mobile nitrogen stations***
 - Self-propelled nitrogen compressor stations***
- Oxygen plants and stations
 - Adsorption oxygen plants
 - Membrane oxygen plants
 - Cryogenic oxygen plants
 - Adsorption oxygen plants for cylinders filling
 - Mobile oxygen stations for cylinders filling
- Cryogenic plants for nitrogen, oxygen and argon production
- Nitrogen fire-fighting units
- Hydrogen plants
 - Membrane hydrogen plants
 - Adsorption hydrogen plants
- Hydrocarbon plants

** Products described in this booklet*



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