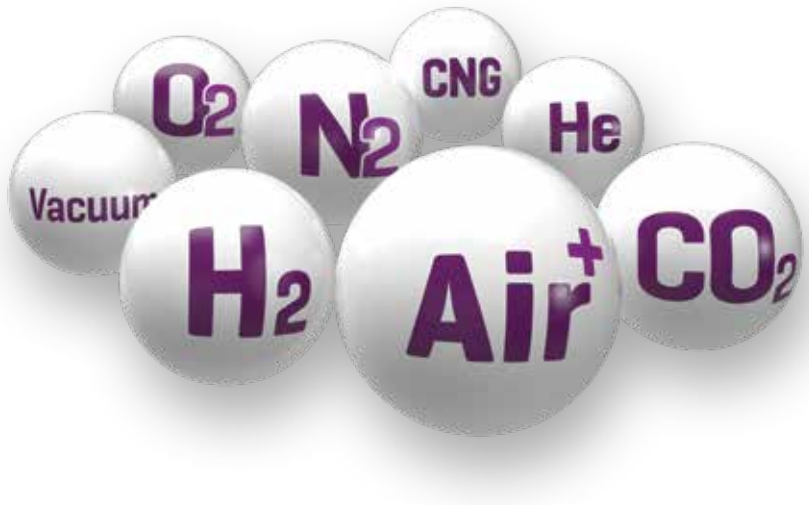
OMEGA AIR

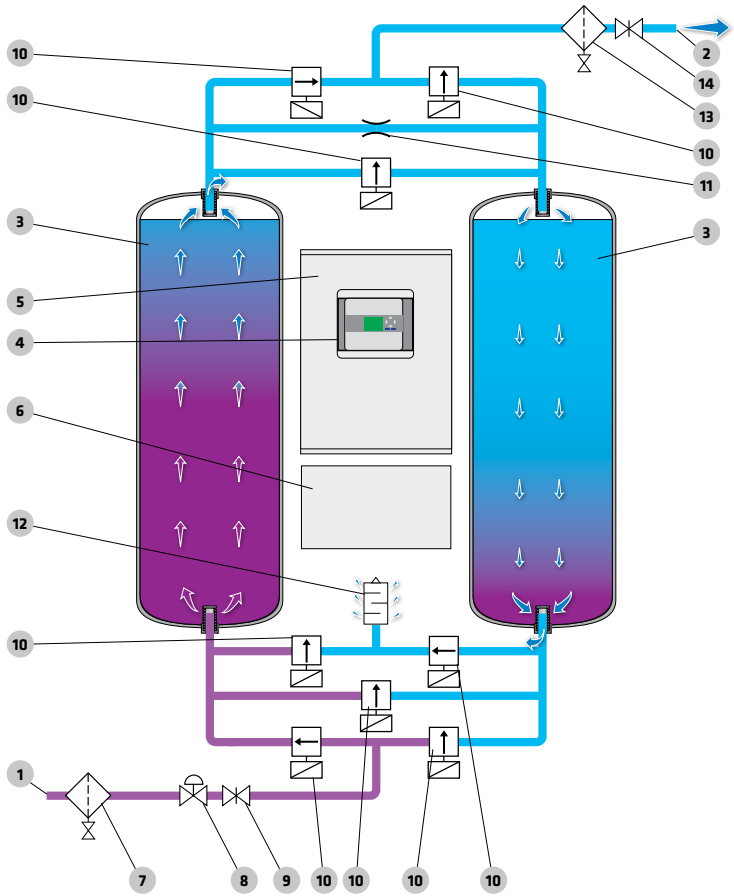
more than air



Gas generators

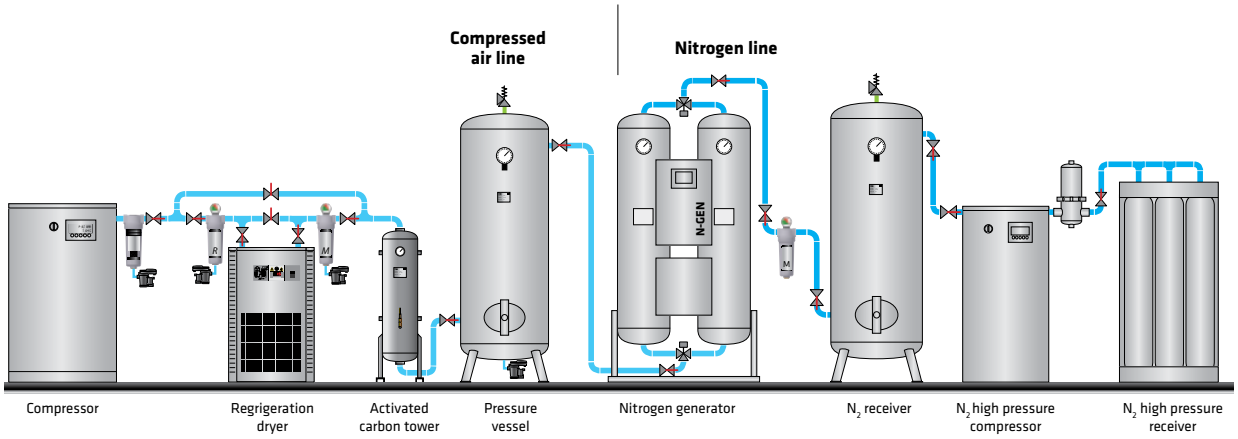
Nitrogen generators





1 Cleaned compressed air inlet
2 Gas outlet
3 Column filled with molecular sieve
4 Siemens Interface KTP 400
5 Electrical cabinet
6 Pneumatic cabinet
7 Microfilter
8 Pressure regulator
9 Compressed air flow regulator
10 Angle seated valve with pneumatic actuator
11 Purge nozzle
12 Exhaust silencer
13 Prefilter
14 Gas flow regulator

GENERATORS		Pressure	Capacity	Purity	Dew point
N-GEN	PSA nitrogen generators	6-10 bar	0,83 - 766,8 Nm^3/h	up to 99,999 %	<-45°C
NM-GEN	Membrane nitrogen generators	5-24 bar	0,8 - 780 Nm^3/h	up to 99,5 %	<-50°C



N-GEN

PSA Nitrogen generators



Oper. pressure	6 - 10 bar
Capacity	0,83 - 766,8 Nm^3/h
Dew point	<-45 °C
Nitrogen purity	up to 99,999 %

NM-GEN

Membrane Nitrogen generators



Oper. pressure	5 - 24 bar
Capacity	0,8 - 780 Nm^3/h
Dew point	<-50 °C
Nitrogen purity	up to 99,5 %



NITROGEN

Nitrogen is an inert gas that is suitable for a wide range of applications, covering various aspects of chemical manufacturing, processing, handling, and shipping. Nitrogen has low reactivity and it is excellent for blanketing and is often used as purging gas. It can be used to remove contaminants from process streams through methods such as stripping and sparging. Due to its properties it can be used for protection of valuable products against harmful contaminants. It also enables safe storage, usage of flammable compounds and can help prevent combustible dust explosions.

Generating nitrogen gas

Industrial nitrogen gas can be produced by either separation of gaseous air using adsorption (PSA) or fractional distillation of liquefied air using cryogenic methods.

Pressure swing adsorption

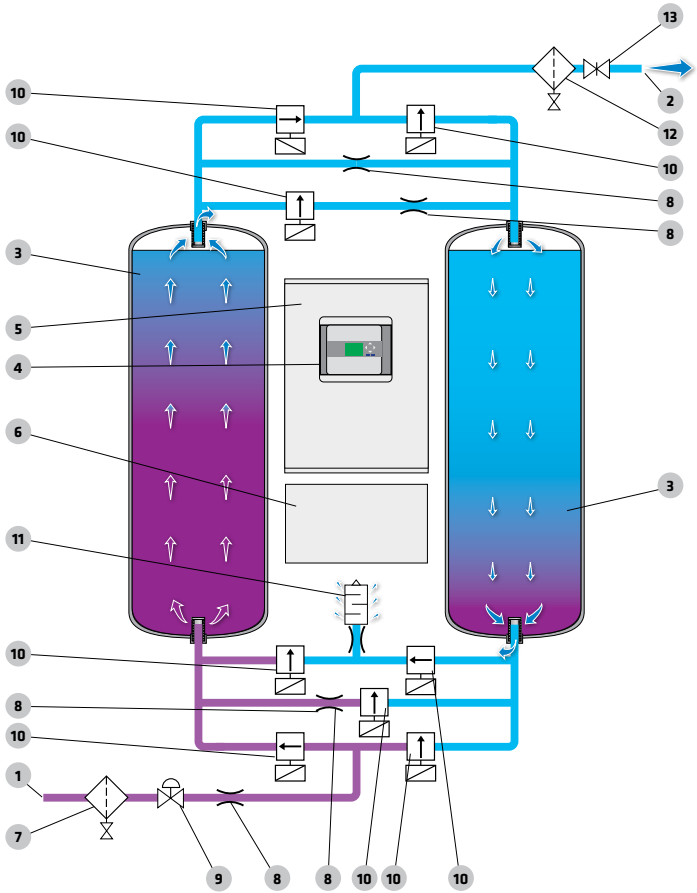
The first step in the PSA process is compressed air passing through a combination of filters and an activated carbon tower with the purpose of removing dust, entrained oil and water. The purified air is then directed to one of two adsorption vessels that are packed with carbon molecular sieves (CMS). The remaining impurities such as carbon dioxide and residual moisture are adsorbed by the CMS at the entrance of the adsorbent bed.

When the CMS is at high pressure, it selectively adsorbs oxygen, allowing nitrogen to pass through it at the desired purity level. While one vessel is at high pressure to produce nitrogen, the second vessel is depressurized to remove the adsorbed oxygen, which is then vented to the atmosphere. The automatic switching between adsorption and desorption between the two beds enables the continuous production of nitrogen. By adjusting the size of the air compressor and adsorption vessels containing the CMS, a large range of flow and purity combinations can be met. PSAs can economically produce nitrogen gas at flowrates from less than one cubic meter per hour to greater than a few thousand cubic meter per hour at purities ranging from 96% to 99.999%.

Gas generators

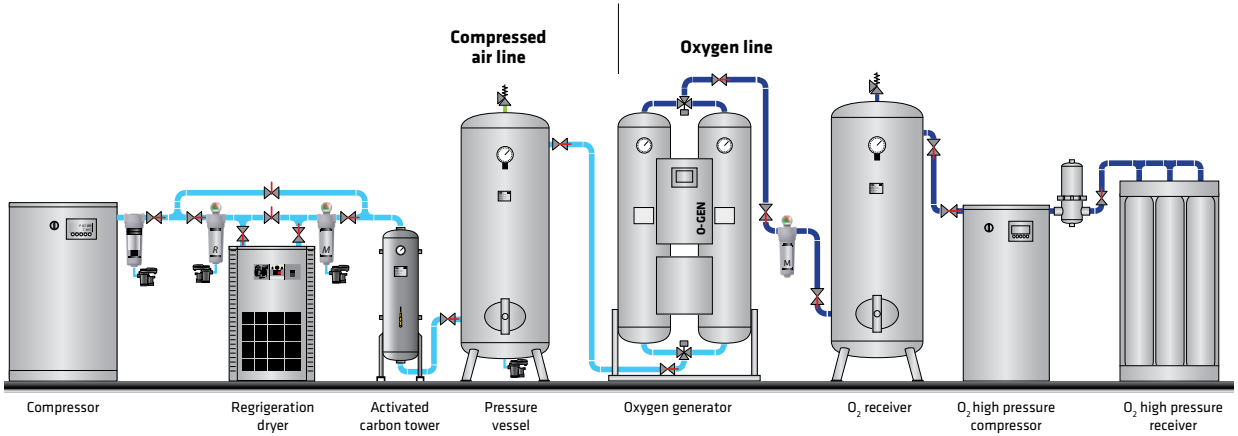
Oxygen generators





1 Cleaned compressed air inlet
2 Oxygen outlet
3 Column filled with molecular sieve
4 Siemens Interface KTP 400
5 Electrical cabinet
6 Pneumatic cabinet
7 Microfilter
8 Nozzle
9 Pressure regulator
10 Angle seated valve with pneumatic actuator
11 Exhaust silencer
12 Dust filter
13 Oxygen flow regulator

GENERATORS		Pressure	Capacity	Purity	Dew point
O-GEN	PSA oxygen generators	5-6 bar	1,02 - 94,9 Nm^3/h	up to 95 %	<-60°C



O-GEN

PSA Oxygen generators



Oper. pressure	5 - 6 bar
Capacity	1,02 - 94,9 Nm^3/h
Dew point	<-60 °C
Oyxgen purity	up to 95 %



OXYGEN

Oxygen, is present in the air with concentration around 21%. Oxygen is at atmospheric conditions always present in gas phase with no odour, colour or taste. It is a highly reactive substance, reacting with almost all elements, except inert gases. This is why it is used in a variety of applications: aquaculture, feed gas for ozone generators, glass blowing, leaching, NOx reduction for fuel burners, oxygen lancing, welding and health care.

Generating Oxygen gas

Oxygen gas can be produced by either separation of gaseous air using adsorption (PSA) or fractional distillation of liquefied air using cryogenic methods.

Pressure swing adsorption

The first step in the PSA process is compressed air passing through a combination of dryers, filters and an activated carbon tower with the purpose of removing dust, entrained oil and water. The purified air is then directed to one of two adsorption vessels that are packed with 5% of activated alumina (AA) and 95% of molecular sieves (MS). The remaining impurities such as carbon dioxide and residual moisture are adsorbed by the activated alumina (AA) at the entrance of the adsorbent bed. When the MS is at high pressure, it selectively adsorbs nitrogen, allowing oxygen to pass through it at the desired purity level. While one vessel is at high pressure to produce oxygen, the second vessel is depressurized to remove the adsorbed nitrogen, which is then vented to the atmosphere.

The automatic switching between adsorption and desorption between the two beds enables the continuous production of oxygen. By adjusting the size of the air compressor and adsorption vessels containing the MS, a large range of flow and purity combinations can be met. PSAs can economically produce oxygen gas at flow rates from less than one cubic meter per hour to greater than a few hundred cubic meter per hour at purities ranging from 90% to 95%.

Gas dryers

CO2 dryers



Under normal conditions, carbon dioxide (CO_2) is a colourless and odourless gas, with a slightly sour taste, denser than air and non-flammable. It is present in the atmosphere in a concentration of about 400 ppm.
CO_2 is not toxic in small quantity but higher concentration are dangerous for health due to the reduction of oxygen rate.
Thanks to its relative neutrality and abundance, this gas is used in numerous applications such as Food & Beverage (breweries), Welding, Cooling, Packaging and many others.
But because it usually needs to be compressed and liquefied to be stored, we have to treat it first, and specially dry it.



Heat Regenerated Dryers

Carbon Dioxide is a gas which can be highly corrosive, depending on its level of humidity.
Compressed Carbon Dioxide Dryers (CO_2 Dryers) are therefore normally custom made, to meet specific project requirements.
Several versions are available, based on operating pressure, temperature, requested pressure dew point and level of humidity. Depending on this last criteria, the dryer's materials will need to be modified.

The type of regeneration is, by default, conducted with heat provided by an external heater (heating phase), and blown ambient air cooled by water (cooling phase).
But depending on the existence and the type of the available fluids to conduct the heating/cooling, we can adapt the regeneration and the components of the CO_2 Dryer, to ensure that a strict minimum of gas will be lost during the whole process.

- Compact units – perfect for container-sized applications
- Food Grade available on request
- Adapted for 100 % water saturated gas
- Covers all pressures, for all applications
- Higher flows on request
- Design adaptable to each application/ project

CO2-DRY

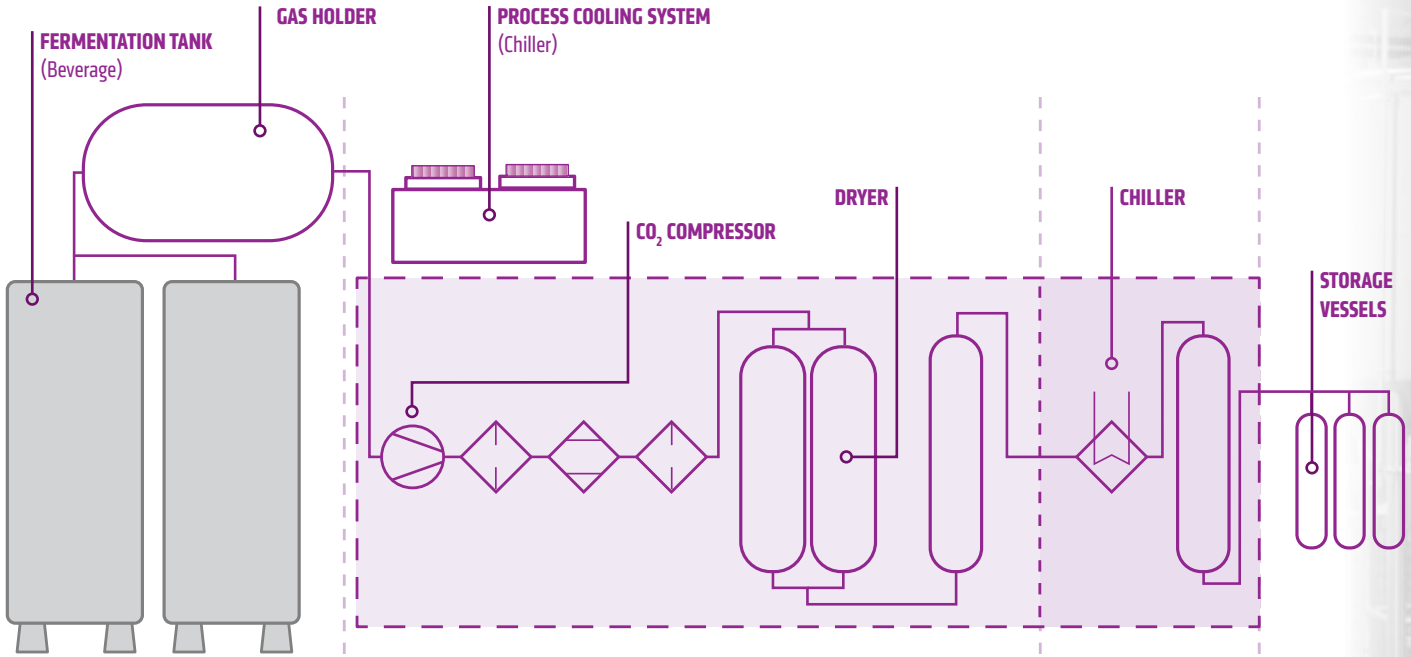
Carbon dioxide dryers



Oper. pressure	4 - 40 bar
Capacity	100 to 12. 550 Nm^3/h
Dew point	-25 °C to -70 °C

The example of CCU from beverage fermentation

Once the fermentation is complete, the CO_2 produced is usually released into the atmosphere, which represents a risk for human health (many accidents to be deplored each year) and for the environment (CO_2 being a greenhouse gas). Instead, Omega Air proposes to purify and liquefy this CO_2, as the below simulation shows, in order for the owner of the installation to recover and add value to this gas by reusing it or selling it locally. Last but not least, Carbon Capture systems can also be transposed to other applications, whether you could still apply the Direct Capture or you would need to install a separation unit before the purification process.



CAPTURE

Alcoholic fermentation is a biological process in which sugars are converted into energy in the form of adenosine triphosphate (ATP), producing ethanol and carbon dioxide (CO_2) as metabolic waste products. The CO_2 is gathered in a soft CO_2 buffer.

PURIFICATION

Used to create the best conditions (pressure, cleanliness and dew point) to enable later Liquefaction.

LIQUEFACTION

Liquid CO_2 is safer and easier to handle as compressed under high pressure.

STORAGE

CO_2 can be used on-site or sent elsewhere for further usage.



Gas dryers

CNG dryers
He dryers



Process gas drying is a critical operation in many industries, including petrochemical, natural gas, and chemical manufacturing. The process involves removing moisture from gases used in manufacturing, processing, and transportation to prevent corrosion, maintain product quality, and ensure safe operations. This article explores the different types of process gas drying methods used in industry, their applications, and the benefits they offer.

Types of Process Gas Drying Methods

Adsorption
Adsorption is a commonly used process gas drying method that involves passing the gas through a bed of desiccant material. The desiccant material, which can be silica gel, activated alumina, or molecular sieves, adsorbs the moisture in the gas, leaving it dry. The desiccant material can be regenerated by heating it to a high temperature, which releases the moisture it has adsorbed. Adsorption is a highly efficient process gas drying method that can achieve very low dew points.

Refrigeration
Refrigeration is another common process gas drying method that uses a refrigeration unit to cool the gas below its dew point, causing the moisture in the gas to condense and form liquid droplets. The liquid droplets are then removed from the gas using a separator. Refrigeration is a highly effective process gas drying method that can achieve very low dew points.

Membrane Separation
Membrane separation is a process gas drying method that uses a semi-permeable membrane to remove moisture from the gas. The membrane allows the water molecules in the gas to pass through while preventing other gases from passing through. Membrane separation is a highly efficient process gas drying method that can achieve very low dew points.

Benefits of Process Gas Drying

Corrosion Prevention
Moisture in process gases can cause corrosion in pipelines and equipment, leading to costly repairs and downtime. Process gas drying helps prevent corrosion and maintain equipment integrity.

Product Quality

Moisture in process gases can also affect product quality. Process gas drying helps maintain product quality by ensuring that the process gases used in manufacturing are dry and free of contaminants.

Safe Operations

Moisture in process gases can create safety hazards, such as explosions and fires. Process gas drying helps ensure safe operations by removing moisture from process gases and reducing the risk of accidents.

Process gas drying is a critical operation in many industries, including petrochemical, natural gas, and chemical manufacturing. The process involves removing moisture from gases used in manufacturing, processing, and transportation to prevent corrosion, maintain product quality, and ensure safe operations. There are several types of process gas drying methods available, including adsorption, refrigeration, and membrane separation. Each method offers its unique benefits and is suitable for different applications. By choosing the right process gas drying method, industries can achieve cost savings, improved product quality, and safer operations.

CNG-DRY

Compressed natural gas dryers



Oper. pressure	0,1 - 420 bar
Capacity	on request
Dew point	-40 °C

Compressed natural gas dryers (CNG dryers) are designed for continuous separation of water vapour from compressed natural gas thus lowering the dew point.

CNG-DRY dryers are normally custom made to meet specific project requirements. Several versions are available based on operating pressure and type of regeneration.
G-DRY type of the dryers are manual controlled and without regeneration. After the saturation of the dryer it is possible to replace adsorption material or regenerate it with external regeneration system.
CNG-R-DRY has two columns that operate alternately. Adsorption takes place under pressure in the first column while the second column is heat regenerated.
CNG-HP-DRY has also two columns that operate alternately. Regeneration is made by small portion of already dried CNG at the ambient pressure. Purge CNG is let to the suction side of the compressor.

He-DRY

Helium dryers



Oper. pressure	5 - 420 bar
Capacity	on request
Dew point	-25 °C to -70 °C

Since Helium is an inert gas that has many similarities with air, it can therefore be used with our standard products to purify and dry it.
Since many industries can benefit from its unique properties to optimize their performance and productivity, to reduce labor costs and to make their operations safer, it is very important to determine in advance the technology which will best fit your Helium application.

He-A-B-F-DRY are different series of Low Pressure Heatless Regenerated Adsorption He Dryers
He-HP-DRY is a series of High Pressure Heatless Regenerated Adsorption He Dryers
He-R-DRY is a series of Low Pressure Heat Regenerated Adsorption He Dryers
He-HPR-DRY is a series of High Pressure Heat Regenerated Adsorption He Dryers



Gas purifiers

Hydrogen purifiers



Characteristics

The dihydrogen H_2 molecule, made up of two hydrogen atoms, is commonly called "hydrogen" and was discovered in 1766 by the British physicist Cavendish. Under normal conditions of temperature and pressure, hydrogen is a colorless and odorless gas but also the lightest element of the periodic table. It is soluble in water up to 1.6 mg/L at 21 °C.

It is the simplest member of the family of chemical elements and the most abundant one in the universe (main element of the Sun and stars). However, it is rarely found alone on and in the Earth, and is very often an integral part of various organic materials and, more importantly, water (H_2O).

Depending on its temperature and pressure, it can be found in different states: gaseous, liquid, solid, metallic and triatomic. Here, we will only concentrate on hydrogen in its gaseous state.

Applications

The earliest known important chemical property of hydrogen is that it burns with oxygen to form water (H_2O), it was therefore made famous for its usage in the process of nuclear fusion. But it is now even more famous for its extremely low density, allowing it to be an energy vector to answer the problematic of electricity storage. Therefore Hydrogen is today widely considered as one of the key features that will play a major role in the world's energy transition.

Hydrogen can be used for a variety of Industrial, Residential and Mobility applications:

- Chemical industry | Production of ammonia and other fertilizers (50% of global consumption)
- Petrochemical industry | Sulfur removal | Creation of gasoline and diesel (hydrocracking) | Methanol production (synthesis of amines and alkanes by hydrogenation)
- Food industry | Production of margarine and butter (fat hydrogenation)
- Welding | Atomic Hydrogen Welding (also called Plasma)
- Glass production | As antioxidant or shielding gas when coupled with nitrogen
- Electronics manufacturing | Production of semiconductors, LEDs, displays, etc
- Aerospace | Rocket's engines (liquid form)
- Housing | Lighting, Heating
- Hydrogen Refueling Stations (HRS) for "Green Mobility" | Fuel Cells Electric Vehicles, FCEVs

H2 Pure Units – Specifications

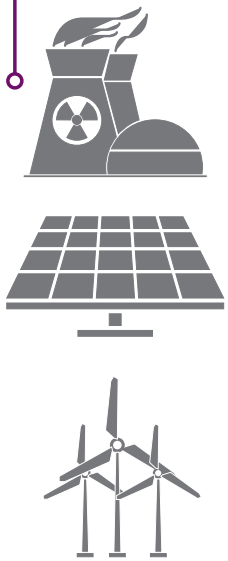
H2 Pure Units are designed for continuous separation of water vapour, oxygen and solid particles from hydrogen gas, making them eligible to all applications possible, including Fuel Cells (ISO 14687:2019). The unit is designed for fully automatic operation.

A proven and robust design enables efficient and reliable operation, fast installation and simple maintenance. The Purification Unit is suitable for easy integration in electrolyser hydrogen package. Version "P" consumes up to 2 % of hydrogen for regeneration while version "X" performs regeneration in closed loop meaning zero hydrogen is wasted during regeneration. Both versions are available with optional deoxo unit which reduces oxygen content down to <5 ppm.

PURIFICATION MODULE IN ELECTROLYSIS PLANT

POWER SOURCE
(Electricity)

The basis of every electrolysis plant is to have the insurance to receive constant power source (e.g. renewable for green hydrogen) and water supply.



COOLING SYSTEM
(Chiller)

PEM STACK

It then goes into PEM stack where, when it reacts with water, hydrogen and oxygen will be produced.

HYDROGENE SUPPLY
(To fuel cell or other consumer)

HIGH PRESSURE COMPRESSION
(Booster compressor & Cylinders)

DEOXO
(Oxygen removal)

FILTRATION

DRYER

PURIFICATION UNIT

The mix of gas will enter our PURIFICATION UNIT, composed of filtration, DEOXO and dryer units. Thanks to this stage, the exiting gas will be free of any excess of solid particles, oxygen and humidity.

Purification unit main features

All-in-one unit, built on the most compact SKID.

- Performances according to ISO 14687:2019 for Fuel Cells
  - < 5 ppm of O2 residual content
  - < 5 ppm of H2O residual content
  - < 1 um solid particles
- ZERO LOSS of HYDROGEN during the regeneration

CENTRAL CONTROLLER

This whole system needs to be closely monitored thanks to a CENTRAL CONTROLLER and cooled via a COOLING SYSTEM.

DC POWER SUPPLY

The supplied electricity being usually AC, it needs to go first through a DC power supply before being further processed.

HIGH PRESSURE STORAGE
(Cylinders)

LOW PRESSURE STORAGE
(Metal hydride)

Hydrogen needs to be stored at different pressures depending on the point of use application: low pressure storage or high pressure storage (where a high pressure compressor is needed upstream).

H_2 Pure

Hydrogen purifiers



Oper. pressure	5 - 45 bar
Capacity	on request
Dew point	-25 °C to -70 °C

OMEGA AIR
more than air

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OMEGA AIR d.o.o. Ljubljana
Cesta Dolomitskega odreda 10
SI-1000 Ljubljana, Slovenia
00 386 1 200 68 00
info@omega-air.si
www.omega-air.si

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