

# Oxygen & Nitrogen On-site Solutions



# OXYMAT Nordic

## Proven technology

*OXYMAT A/S is a Denmark based company and the leading global supplier of advanced PSA generator systems since 1978.*

OXYMAT has 40 years of experience in designing, engineering and manufacturing high quality oxygen and nitrogen gas generators to meet customers' specific needs and process specifications.

You can produce your own oxygen or nitrogen with Oxymat PSA gas generators creating high quality nitrogen or oxygen gases on-site. There will be no need to order in, store and stock check your liquid oxygen tanks or nitrogen gas cylinders when you can produce your own supply on site.

Our generators are based on the well-known PSA (Pressure Swing Adsorption) technology, which is an air separation technique which will enable you to produce your own nitrogen or oxygen, using only electricity and atmospheric air. PSA technology can be used in all types of industries.

OXYMAT has produced more than 3800 oxygen & nitrogen PSA generators for many types of applications including: aquaculture, gold mining, medical, ozone, marine, oil & gas, nuclear power plants, biogas, process industry, pharma, food and many more.

With our vast experience in the field of quality, innovation and excellence, we serve our customers to identify, design and provide the best possible solution.

We listen, we design, and we manufacture. Therefore, we have gained the worldwide reputation as the highest quality PSA system supplier.

## Made in Denmark

Our new system is made 100% in Denmark. This includes design, project management, manufacturing, R&D and quality. We have insourced vessel-manufacturing and all our pressure vessels are approved for 8 million cycles of dynamic load at 8 bar(g).

## Material Quality

Fully welded pipe sets and valves are made from stainless steel. All pressure vessels are made from mild steel P265 at our own factory in Denmark.

## Factory Automatization

Our newly built factory started production in 2017. To simplify our production, we have modularized our design and automated our production. To achieve this, we have invested heavily in a state-of-the-art machinery including: welding robot, CNC pipe bending machines and CNC pipe saw.



## Energy Consumption

Our new generators have the best air factor on the market. This means less compressed air is required to produce oxygen/nitrogen. A smaller compressor translates directly into a lower OPEX. Smaller compressors require less power and service parts costs are lower.

## Service

The right service and correct spare parts are essential for a trouble-free operation of a generator system.

The Oxymat service hot line is available 24/7 and the staff work around the clock servicing every spot on the globe.

## Green Energy

Our new factory in Denmark is running 100% on clean energy (wind & solar). Our factory is equipped with solar panels to help with our electrical needs during the 4-6 sunny months in Denmark.

## Unique Design

The design of our new generators is unique. To ensure fast and safe operation, the generators are equipped with LED-lights to give the operator a visual status on the operation of the generator. Thanks to an improved exhaust muffler, the noise level of the generators has been further reduced. The generator system is modular and can be expanded if capacity demands change.

## Factory Automatization

- ISO 9001
- ISO 14001
- Pressure test of all vessels
- NDT of pressure vessels
- 100% purity & capacity test of all units

## Pressure Vessels

- ASME & PED (dual stamped)
- Sandblasted and powder coated C4 or C5 grade for extended life time
- Butt welded for extreme endurance
- Pressure vessels are X-ray examined (inhouse)

# Standard specification

## PSA Generator

The Oxymat Nordic PSA generator is designed for continuous and autonomous operation. The PSA generator will automatically start and stop based on actual gas consumption. The PSA generator will switch to stand-by mode, when no gas is consumed.

## Pressure vessels

- Pressure vessels are designed and manufactured for dynamic load. Vessels are surface treated, and powder coated – inside and outside.

## Pipe sets

- All pipes are stainless steel SS316

## Process valves

- Pneumatic operated. Stainless steel valve seats.

## Molecular sieve

- Proprietary molecular sieve supplied from leading adsorbent manufacturers.

## Control System

**Advanced control system** with integrated PLC. Fast and easy operation is secured through premium user interface on color touch screen.

**Measuring and logging** column pressure, gas pressure and purity. Monitoring of pressure and temperature of air and gas.

**Ethernet communication** for remote control and monitoring.

**Extended alarm** list with indicative and critical levels.

**Automatic start-up** after outages in power supply. UPS can be supplied on request.

**Zirconium** based oxygen sensor for measurement of gas purity.

**Flow control** to regulate actual flow from control panel, and to avoid overflowing of generator by limiting the flow to generator specifications.

**Purity control** for securing correct gas purity. Gas outside of the specifications will be purged and not delivered to consumer.

## Air Package

The air package is tailor-made for each Oxymat Nordic PSA generator, to ensure high quality compressed air while maintaining the most efficient power consumption.

## Compressor

- Star-delta starting method, frequency control on request.
- Air or water cooling method, sea water on request.



## Air dryer

- Refrigeration method (pressure dew point +3° C) – lower dew points possible with adsorption dryer.

## Buffer vessels

- Air buffer vessel secures a steady delivery of compressed air to the PSA. Gas buffer vessel after the PSA secures an even gas flow to the consumer.

## Compressed air filtration

- Ensuring correct compressed air quality class 2.4.1 according to ISO 8573.1:2010.

## Documentation

Standard documentation consisting of manuals in English language. Conformity certificates for PSA, pressure vessels, valves and other relevant materials. Generic piping and instrumentation diagram. Project documentation package available on request.

## Product Range

### Oxygen:

The capacity ranges from 2 to 355 m<sup>3</sup>/h at purities up to 95 %  
Low power consumption: • From 0.7 kW/m<sup>3</sup>

### Nitrogen:

The capacity ranges from 1 to 5415 m<sup>3</sup>/h at purities up to 99.9999%

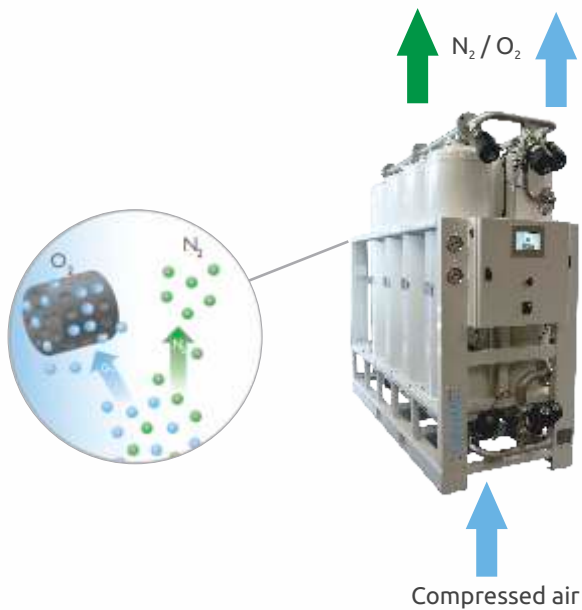
Low power consumption: • From 0.18 kW/m<sup>3</sup>

## OXYMAT Nordic design features:

- Up to 40 % less energy consumption compared to other PSA manufacturers on oxygen
- Noise emission down to 60dB
- Sand blasting & powder coating for extended lifetime
- All pipes and valves are made of SS (stainless steel) 316L
- Low CO<sub>2</sub> emission
- Built-in high-quality touch screen control unit
- Remote control access
- Designed for durability in rough conditions and industrial environments
- Optional container or frame-built solution
- Optional OEM supply



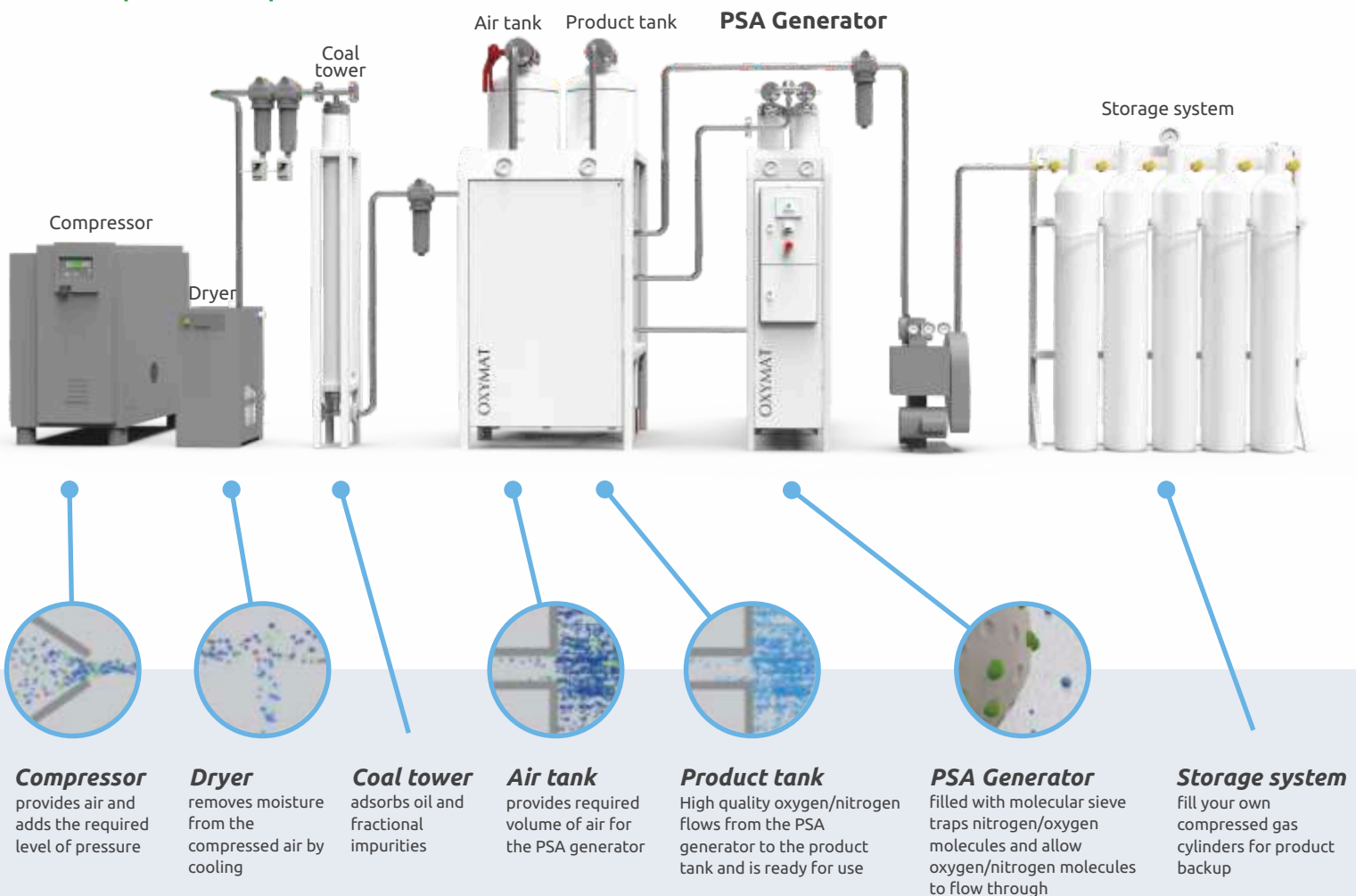
# PSA Technology



## PSA technology

Our generators are based on PSA technology, Pressure Swing Adsorption. This process evolves around the principle of an adsorbent media under pressure, trapping either oxygen or nitrogen molecules, allowing the target molecules to pass. The only raw material needed is the ambient atmospheric air, which makes the PSA process an extremely clean operation.

## PSA process description



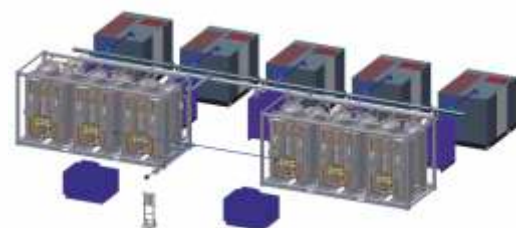




## Gold mines

### Gas company

Since 2010 we have installed several oxygen systems for gold mines worldwide. Heavy duty construction of PSA is designed for rough conditions of the mining environment. The system was delivered with a remote control in order to monitor all process parameters and alarms. The advanced control system makes the operation of PSA systems easier to handle, user-friendly and reliable. Onsite oxygen production made the mine independent of liquid oxygen deliveries from remote locations.



- model 2x O800x5, 20 tons per day, 93%, 12.0 bar



## Laser Cutting

### KGZ / Dobropolje / Slovenia

Laser cutting will normally require high flow rates combined with relatively high purity and pressure, to ensure a clean and smooth cut. Our tailor-made solutions with nitrogen booster just need to be connected to power supply and start filling cylinders. The cost of own produced nitrogen reduced costs by more than 50 % in comparison with inconvenient external gas supply.



- model N600, 7.2m<sup>3</sup>/h, 10 ppm, 200 bar



## Medical

### King Faisal Hospital / Kigali / Rwanda

Complete line including air package, filtration, PSA generator, O<sub>2</sub> receiver, HP booster, vacuum pump and filling line for 20 HP cylinders has been successfully installed and commissioned at King Faisal Hospital, Kigali, Rwanda. Such a solution makes the hospital fully independent from external gas supply and even provides O<sub>2</sub> delivery at the event of primary source failure thanks to special back up system.



- model O500 25Nm<sup>3</sup>/h, 95% purity incl. HP filling, vacuuming and back up supply



## Food & Beverage

### San Clemente / Santiago de Chile / Chile

The system is used for a Controlled Atmosphere (CA) storage systems applied for a long-term fruit and vegetable storage in a remote area in Chile. Since high-pressure technology was applied PSA technology was the best solution. The system has been delivered on the skids as a „plug & play“ solution.



- model 2 x N1000 ECO, 2 x 115m<sup>3</sup>/h, 99% purity

# we serve



- model X4000 Marine Nitrogen PSA, 4.000m<sup>3</sup>/h, 95% purity, 6.0 bar



- Container Nitrogen System I 300 m<sup>3</sup>/h, 95% purity, 120m<sup>3</sup>/h, 99.5% purity



- model O40, 2.3 Nm<sup>3</sup>/h, 93% purity



- model N600ECO, 7.96m<sup>3</sup>/h, 99.999% purity

## Marine & Off-shore

Oddfjell

During 2006-2009 OXYMAT developed our marine versions, and we have so far sold more than 35 units to Chemical Carriers, LNG Carriers & Supply Vessels. The unique design eliminates the need for air- and product vessels. Together with a very low power consumption of 0,2 kW per m<sup>3</sup>, we have launched the smallest foot print world wide. OXYMAT offers Marine Nitrogen PSA from 100 to 10.000 m<sup>3</sup>/h delivered with certificate by all major class associations like DNV, ABS, GL, Lloyds, BV etc.



## Petrochemical

VAOS / Austria

Two unique sets, both containerized, designed for outdoor placement and suitable for transport to different locations. Each of the lines were split into two containers, with an Air package in one, and in the second PSA with complete control. The PSA units were designed for the use in EX environment close to the point of use and capable of remote controlling of the air compressors and dryers located in a safe area. This solution enables the customer to cut down the costs for EX air treatment units to standard ones while keeping the PSA unit capable to perform in the EX environment.



## Aquaculture & Ozone

Damas Zivju Audzetava / Latvia

A customer was looking for a supplier of oxygen to their new fish farm in Latvia. Looking through different ways of supplying the oxygen to their fish farm, they choose a solution, thinking „Why buy it - when we can, make it on-site“. This will help the customer to obtain a fast return on their investment. Adding oxygen into the fish tank and enclosures by diffusers keeps the fish healthy and allow them to grow bigger. Protecting the environment Damas Zivju Audzetava also uses the OXYMAT oxygen generator to their ozone production for their water recirculating and water treatment program.



## Electronics

Note / Torsby / Sweden

The customer uses 10ppm Nitrogen in order to protect the soldering processes from oxidation and leaves a clean solder point resulting in increased products quality. After the comparison the end user found the OXYMAT nitrogen PSA solution to be the most economical and effective source of Nitrogen (constant delivery, competitive pricing and top performance in air/gas relation).



# OXYMAT PSA

## NORTH & CENTRAL AMERICA:

Nitrogen installations in total: 16  
Purities from 97 - 99,5 %  
Applications: Off shore, Food,  
Process Industry.

Oxygen installations in total: 31  
Purities from 92 - 95 %  
Applications: Medical, Aquaculture,  
Ozone, Gold Mining.

## SOUTH AMERICA:

Nitrogen installations in total: 42  
Purities from 95 - 99 %  
Applications: Industrial

Oxygen installations in total: 171  
Purities from 90 - 95 %  
Applications: Medical, Aquaculture,  
Combustion.

## EUROPE:

Nitrogen installations in total: 817  
Purities from 95 < 99,9999 %  
Applications: Process Industry,  
Metal Treatment, Ozone, Food.

Oxygen installations in total: 1145  
Purities from 90 - 95 %  
Applications: Aquaculture, Medical,  
Water Treatment.

## AFRICA:

Nitrogen installations in total: 49  
Purities from 95 - 99,999 %  
Applications: Pharmaceutical,  
Food, Oil & Gas.

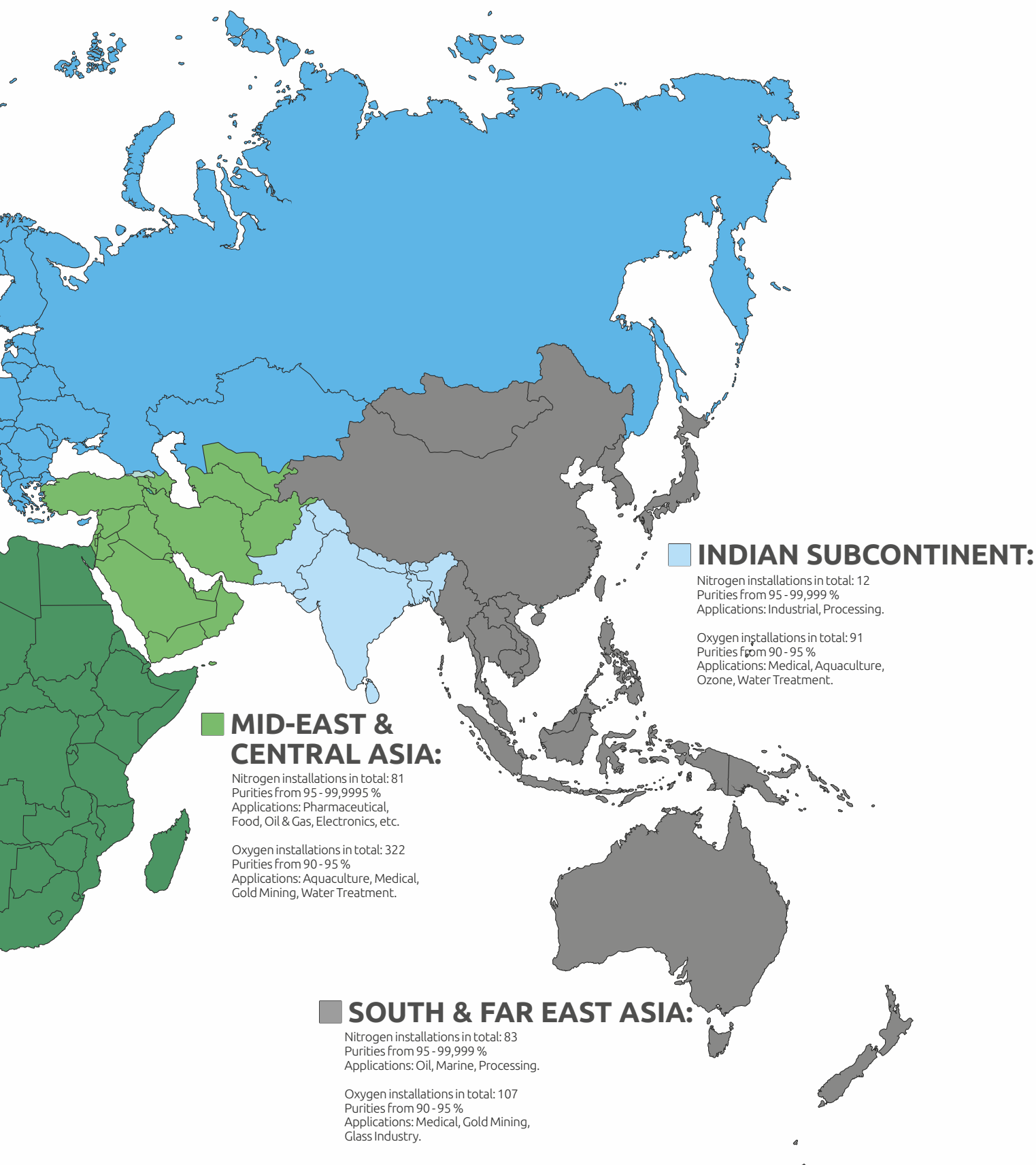
Oxygen installations in total: 156  
Purities from 90 - 95 %  
Applications: Aquaculture,  
Medical, Gold Mining.

*With more than 100 employees worldwide and 3,800 installations in more than 130 countries, Oxymat has become one of the largest players globally in the PSA business. We believe that being close to the market and our customers is vital to our business. We have obtained better market knowledge where we are regionally present. Oxymat has 3 offices worldwide and a wide network of distributors and agents in more than 40 countries.*



# References

\*up to December 2017



\*installations counted from 2005

# OXYMAT at a glance

- HQ in Denmark
- Turnover in 2017 was 22m €
- More than 100 employees worldwide
- Wide network of distributors and agents in more than 40 countries
- Manufacturer of custom designed oxygen and nitrogen systems
- Oxygen generator systems since 1978
- Nitrogen generator systems since 2001
- OXYMAT s.r.o. in Slovakia established in 2006
- OXYMAT China established in 2010
- More than 3800 generator systems installed in more than 130 countries in 2017

- Holds all relevant approvals for the great variety of applications which we serve:

- » ISO 9001
- » ISO 13485
- » ISO 14001
- » ISO 7396
- » ISO 18001 (OHSAS)
- » CE
- » PED 97/23/EC Module B+D
- » MDD 93/42/EEC (Medical Device Directive)
- » GOST
- » US Pharmacopoeia
- » European Pharmacopoeia

- Marine Class societies – we can deliver according to the rules of:

- » American Bureau of Shipping
- » Bureau Veritas
- » Det Norske Veritas
- » Germanischer Lloyd
- » Lloyd's Register
- » Nippon Kaiji Kyokai
- » RINA

## • MADE IN DENMARK

Oxymat Denmark - headquarters



COMPLETE REFERENCE LIST IS AVAILABLE UPON REQUEST

# Our Customers say

## AQUACULTURE

*The Faroese salmon industry has not always been successful. Additionally, we have also been affected by diseases over the years. But for the past 6-8 years, the salmon industry has made great progress. The good and close cooperation between LEIF MOHR and OXYMAT has made it possible for our company today to look back with joy that we have supplied PSA SYSTEMS to all the new Smolt production facilities in the Faroe Islands. We have also replaced some of the old PSA systems with newer models. We look forward to the future and hope that the cooperation between LEIF MOHR and OXYMAT also can benefit to optimize our customers' needs.*

Andrias Joensen  
LEIF MOHR, Faroe Islands

## LASER CUTTING

*A customer in Galway has a high purity OXYMAT nitrogen generator, which is used for cutting stainless steel almost constantly, and the nitrogen supply has been highly reliable and economical. This addition to their engineering works allows them to reduce their production costs, while at the same time, reduce the ordering and handling burden of buying in nitrogen. The target specification was 10 parts per million (ppm) and the plant always exceeds that target. We can recommend OXYMAT nitrogen generators to any Laser Cutting operation.*

AirPro Gas Solutions, Ireland

## AQUACULTURE

*In intensive aquaculture, oxygen is an indispensable addition. HESY Aquaculture, worldwide supplier of turn key Recirculation Aquaculture Systems, and OXYMAT have a solid cooperation of more than 20 years.*

Julian Bondt, Sales Manager  
HESY Aquaculture, Netherlands

## MEDICAL

*Most healthcare providers in Kenya face challenges in ensuring reliable supply of medical oxygen in their facilities. Those who have bought OXYMAT on-site PSA oxygen generating plants, now do not have this difficulty. Their facilities now have consistent supply with the overall effect of lowering mortality associated with inefficient oxygen supply. Our partnership with OXYMAT is therefore of great benefit to the country.*

Philip Simiyu Wandibba, Managing Director  
Pulse Healthcare Limited, Kenya

## MINING

*The OXYMAT nitrogen generating system combined with our container solution have served non-stop in a number of coal mines in the Silesian region. This combination provides a high safety level in operation and at lower costs and minimal downtime.*

Mr. Lukasz Lasek  
Azis mining Service





## Highest level of international approval

OXYMAT Oxygen & Nitrogen systems are designed and manufactured according to European directives:

- » PED (97/23/EC)
- » MDD (93/42/EEC)

Oxymat has long experience in designing, engineering and delivering of hundreds of Oxygen and Nitrogen systems all over the world, in accordance with international and national authorities.



OXYMAT operates a QA system in accordance with international standards:

- » ISO 9001 (Quality Management Systems)
- » ISO 13485 (Quality Management Systems - Medical Devices)
- » ISO 14001 (Environmental Management Systems)
- » ISO 18001 (OHSAS)

Certified by Apragaz and DNV.

## Worldwide manufacturer of PSA generators



### Denmark

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