




# OGV+ VSA – oxygen generator

Low pressure oxygen generator from 100 kg/h

# OGV+ VSA – Oxygen generator

The OGV+ VSA is 100% oil-free technology with an integrated drying layer and large turndown ration with variable flow blower and extractor, ensuring maximum energy savings.



Majority of CO2 emissions from oxygen use is in its transport from production facility to end user.



## Lowest oxygen costs and CO2 emissions

No truck shipments of liquid oxygen required. Produce oxygen at the lowest possible costs and CO2 emissions.



## Only produce what you need

Produce the amount and purity oxygen that you need, any time and on-site.



## Most efficient at any flow

Constant low specific energy required to produce one unit of oxygen remains.



## Large turndown ratio

Variable flow blowers and extractor pump ensure a large turndown ratio and guarantee low energy consumption, even at reduced load.



## Oil-free technology

Oil and oxygen are a very hazardous combination. Atlas Copco therefore offers unique 100% oil-free oxygen generation technology including ISO8573-1 class 0 oil-free blower and extractor.



## No air dryer required

The OGV+ has an integral drying layer that captures all moisture and CO2 before the oxygen is concentrated.



# Segments and applications

Oxygen generators can be used across a variety of segments and for multiple applications. Read on to discover a few applications for the OGV+ VSA.



Oxygen generation for fish farming / aquaculture <sup>1</sup>



Oxygen and ozone generation for water and wastewater treatment <sup>2</sup>



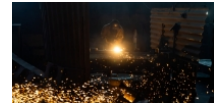
Oxygen generation for gold and silver mines <sup>3</sup>



Oxygen generation for paper pulp bleaching <sup>4</sup>



Oxygen generation for H<sub>2</sub>S reduction in biogas plants <sup>5</sup>



Oxygen generation for oxy combustion <sup>6</sup>



## Oxygen generation for fish farming / aquaculture

Oxygen is an essential component in aquaculture systems, as it plays a critical role in supporting the respiration and metabolism of aquatic organisms like fish and shrimps. Sufficient oxygen concentration in the water makes the fish and shrimps healthier and grow faster.

In aquaculture, oxygenation by injecting pure oxygen to the water through diffusers, is typically used in high-density type fish farming, either on open sea or land-based technology.

Atlas Copco's oxygen generators are designed to cope with the gradually increasing oxygen demand when the fish grow over their lifecycle.

## Oxygen and ozone generation for water and wastewater treatment

Oxygen can be used in addition to aeration with blowers in wastewater treatment to temporarily increase the capacity of the wastewater plant. By injecting concentrated oxygen into the wastewater system, you encourage growth of bacteria that drive the activated sludge process. Ozone, which can be created by forcing oxygen through a high voltage metallic grid, is used effectively in water purification and replaces the need of chlorines to purify water up to federal standards for consumption.



## Oxygen generation for gold and silver mines

Oxygen is commonly used in gold and silver mining to aid in the extraction of gold and silver from ore. Oxygen is used in a process called leaching, which is a process to dissolve gold from its ore. The addition of oxygen to leaching process increases the yield of gold and silver recovered where the rate of gold dissolution is directly proportional to the dissolved oxygen (DO) level in the pulp.

### Oxygen generation for paper pulp bleaching

On-site oxygen production is essential for the pulp and paper industry. Products such as paper, tissue, and eco-friendly packing material, are supported by oxygen injection to speed up the delignification of pulp, increases lime kiln capacity and reduces consumption of expensive bleaching chemicals, all to enable efficient and quality production.



### Oxygen generation for H<sub>2</sub>S reduction in biogas plants

H<sub>2</sub>S in biogas plants pose serious problems. A simple, yet effective method to remove hydrogen sulfide is to introduce gaseous oxygen into the biogas fermenter. Oxygen is injected into the space above the liquid in the fermenter, where the oxygen will react with the hydrogen sulfide. In this process, the hydrogen sulfide is oxidized into elemental sulfur by microorganisms that grow on the inside of the biogas fermenter.

### Oxygen generation for oxy combustion

Conventional air combustion is to use 21% oxygen in the air to boost combustion while about 78% nitrogen in the air reacts with oxygen at high temperatures, producing a large amount of hazardous NO<sub>x</sub> and taking away part of the heat. This results in lower thermal efficiency of air combustion, energy wastage and air pollution. Mixing oxygen with fuel in a certain proportion can save over 30% of fuel compared with air-assisted combustion technology, with higher flame temperature, faster heat transfer, higher combustion efficiency, lower exhaust gas emission and other excellent features on energy saving and environmental protection.



# When to choose OGV+ VSA?

OGV+ oxygen generators are known for its superior energy efficiency. The right graph helps with the right product selection since the most suitable solution is always a balance between investment costs and operational costs.

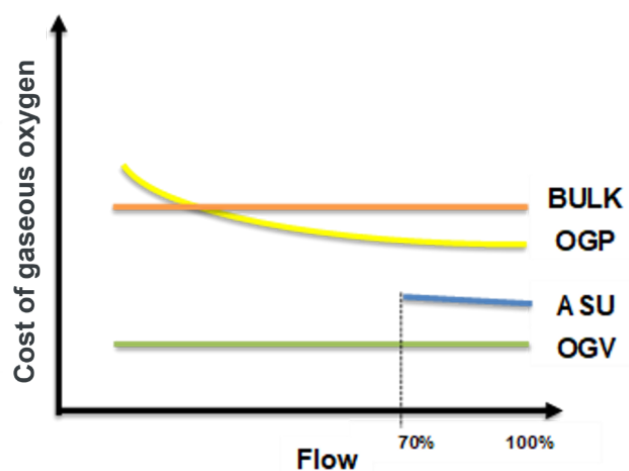
In oxygen generation, more than 80% of the costs of producing oxygen is the cost of electricity to run the compressors or blowers.

Blowers run at higher efficiency than compressors since they need to compress the air less, which makes that an OGV+ has the lowest cost to produce oxygen. The Atlas Copco OGV+ also has an advanced controlling algorithm that ensures a unique constant energy consumption over the entire turndown ratio of the equipment.

Should we then always select an OGV+? No, for lower flow or low running hours it's still interesting to look at Atlas Copco OGP and OGV+ oxygen generators since the investment cost for such a technology is lower.

Air separation units (ASU), are typically only used for very large consumers that have a constant demand in for example the steel industry or chemical industry. ASU's are also known for being limited in capacity reduction and cannot be stopped for a few days of non-production like during a weekend.

Bulk supply of oxygen is a solution with minimal investment costs but high costs of gas since the oxygen is produced at an external site and needs to be transported in compact form by trucks to its destination. These trucks add costs to the gas and generate unnecessary CO2 emissions. To be able to transport oxygen in a compact way, oxygen is liquified first, which is a process that costs almost the same amount of energy as producing the oxygen and further increases the cost of oxygen and CO2 emitted.



# Components design for reliability

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## OGV VPSA

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## 1 Packed bed adsorber towers

Ensure reliable operation in any case



## 2 Integrated zeolite layer

To concentrate nitrogen



## 3 Integrated drying layer

To avoid use of external dryer



## 4 Flow meter

Detect the oxygen demand and enable energy saving features



## 5 Elektronikon controller

Central controller for OGV, blower and extractor



## 6 Long lifetime valves

Ensures minimal replacement costs and security



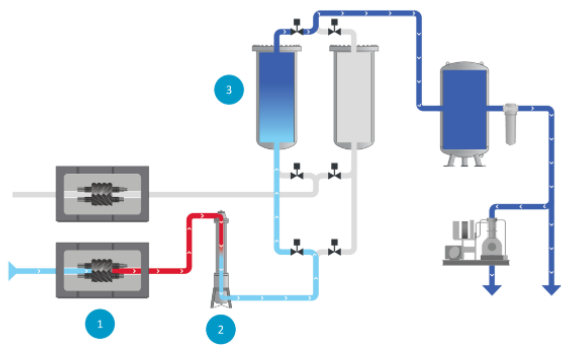
## 7 O2 Analyser

Constant measuring of oxygen quality with the option to blow off oxygen if the purity is too low



# Flowchart OGV+ VSA

The feed for any oxygen generator is air which contains 21% oxygen and the balance nitrogen with a few other impurities. The goal of the O2 VSA process is to efficiently capture the nitrogen and other contaminants while allowing the O2 to pass through unencumbered where it will be delivered as final product.



## Working principle- step 1

Atlas Copco OGV+VPSA oxygen generators consists of two adsorption columns in parallel, in batch sequence switched by automatically controlled valves. Each column includes a drying layer that removes moisture plus CO2 followed by a zeolite type adsorption layer that separates the nitrogen from the air so that the desired component oxygen remains.

In this VPSA process, air is taken from the atmosphere and compressed by the class 0 oil-free blower (1). Since compression of air generates heat, the air needs to be cooled via cooler (2) before going to the oxygen generator (3)

## Working principle- step 2

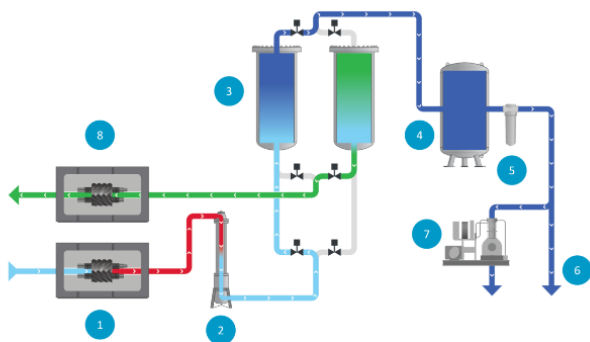
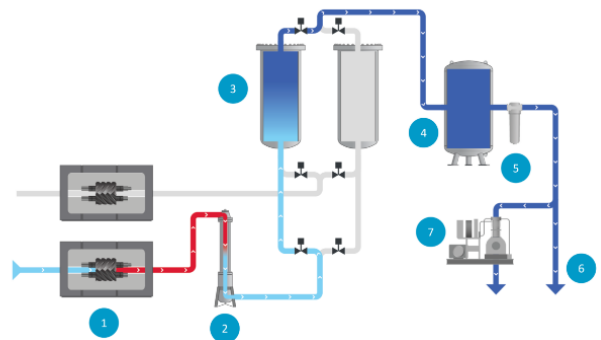
In the dual tower oxygen generator, there is always one column capturing all contaminants so that there is only an almost pure trace of oxygen remaining.

In the left column of oxygen generator (3), first all moisture is removed, secondly all carbon monoxide is removed and as a last step almost all nitrogen is removed.

Out of the generator now comes a stream of very pure oxygen combined with remaining traces of inert gases nitrogen and argon that enters oxygen buffer tank (4)

When leaving buffer tank (4), the oxygen is first filtered by a special oxygen filter (5) to remove any traces of dust or other small particles. Sterilizing grade filters are optionally available.

Now the oxygen is ready to be supplied to the consumer at low pressure (6) or optionally at higher pressure by means of an oxygen booster compressor (7)



## Working principle- step 3

The zeolite used in the oxygen generator (3) is of a regenerative type. It means after one purification cycle, it can be upgraded again to a 'new' state again.

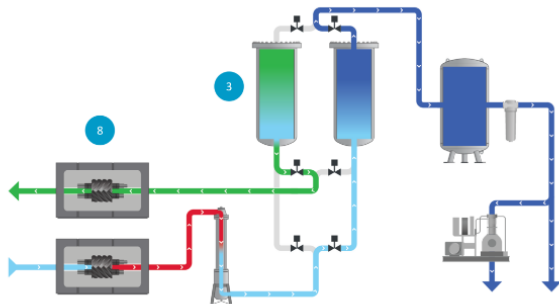
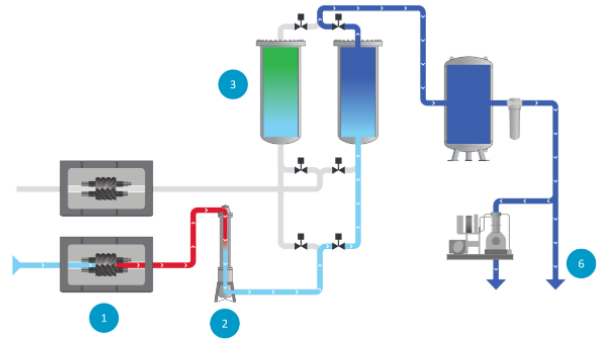
While the left column of oxygen generator (3) is purifying the oxygen, the right column will be stripped from the nitrogen and moisture impurities to make it ready again for a new purifying cycle.

To ensure fast stripping of these impurities, the pressure inside the right tower is dropped drastically to a very low pressure by means of extractor (8). This class 0 oil-free extractor (8) sucks out all impurities and exhausts them back to where they came from, the atmosphere.

#### Working principle- step 4

One oxygen purification cycle, in one of the columns of oxygen generator (3), takes maximum 1 minute. After this one minute the columns of oxygen generator (3) switch cycles so that the other column can start adsorbing nitrogen.

In this example the purification cycle switches from the left column to the right column. During this cycle the delivery of oxygen (6) is uninterrupted, and the class 0 oil-free blower (1) keeps on running.



#### Working principle- step 5

After isolating the left column, simultaneously the extraction of impurities from this column starts. Extractor (8) is connected to this column and by reducing pressure it extracts all impurities and vents them into atmosphere again.

The OGV+ oxygen generator is designed to run continuously and will last millions of purification and extraction cycles.

# OGV+ VSA efficiency and connectivity

It is a smart device with automatic start-up and stop including low load controls and intelligent controls standard including remote monitoring functionality.

## Connectivity as a standard for maximum efficiency and reliability



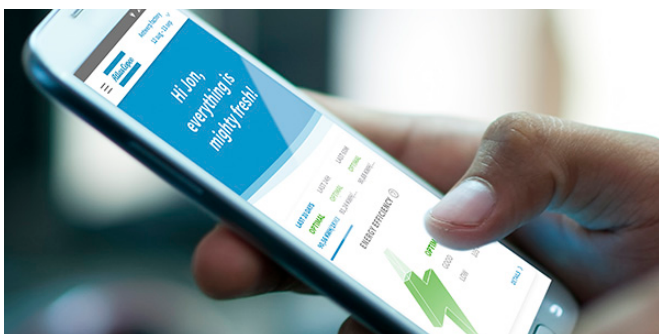
### Automatic start-up and stop including low load controls

Typical oxygen applications never have constant demand, the demand typically fluctuates over a certain period even including periods of minimal to no demand. The Atlas Copco VSA contains the following features to ensure smooth operations under any condition:

- The oxygen flow meter detects the actual oxygen demand on which the Elektronikon controller decides to start or stop the VSA including blower and extractor
- Automatic start and stop valves are combined with the flow meter algorithm in the Elektronikon controller. No manual start-up required and smooth unit commissioning.
- At low load the operating cycles are adjusted to reduce energy consumption

### Elektronikon® control – intelligent controls as a standard

The Atlas Copco Elektronikon® control and monitoring system uses advanced algorithms for maximum reliability. The controller can handle 31 languages and all commonly used pressure, temperature and flow units facilitating easy understanding of the operating cycle of the equipment. By always using the same controller, all equipment are fully optimized to work together in the most efficient and reliable way.



### Including remote monitoring functionality

3G Smartlink connected controllers for IOT4.0 ready remote monitoring. It allows fingertip monitoring of your compressed air system through your own secured network.

#### Monitor your compressed air installation with Smartlink

Knowing the status of your compressed air equipment at all times is the surest way to achieve optimal efficiency and maximum availability.

#### Go for energy efficiency

Customized reports on the energy efficiency of your compressor room.

#### Increase uptime

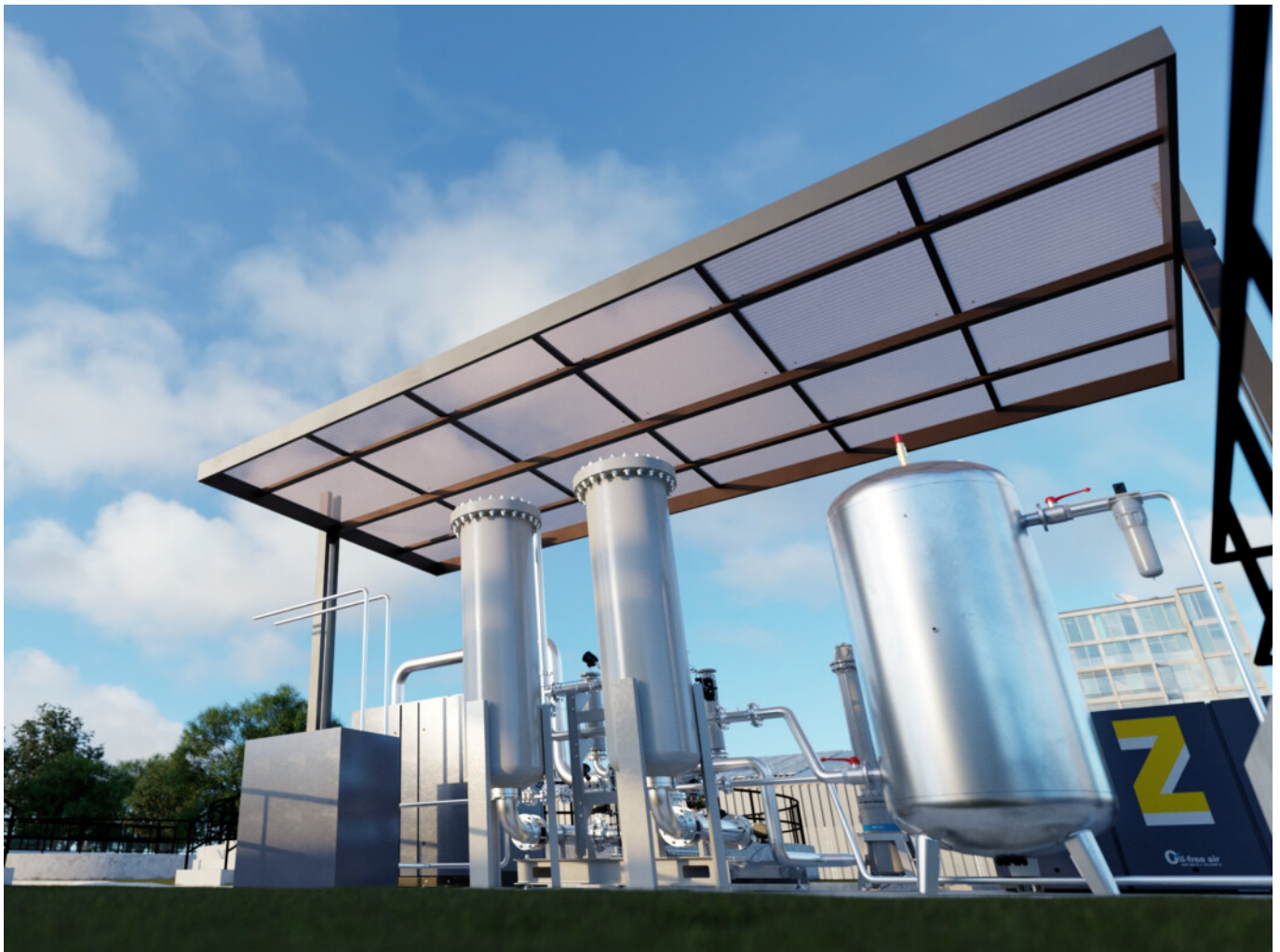
All components are replaced on time, ensuring maximum uptime.

#### Save money

Early warnings avoid breakdowns and production loss.

# Options and engineered solutions

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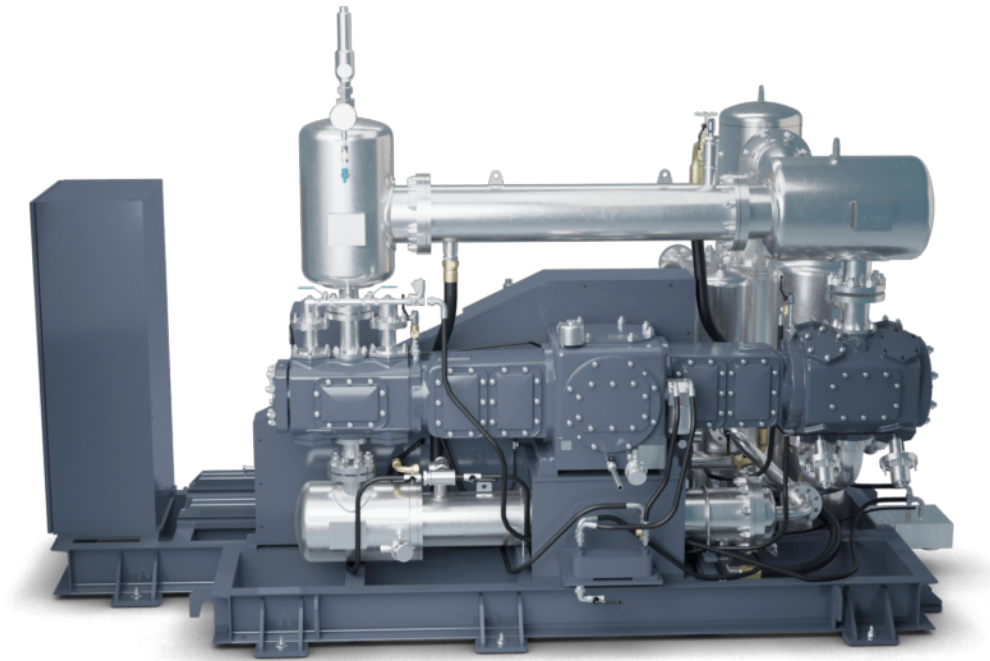
## Oxygen receiver

Each OGV needs an O<sub>2</sub> buffer tank to ensure smooth operation and stable gas quality. Atlas Copco has the right receivers in our portfolio that are cleaned for oxygen service.



#### PDp+ O2: Quality filtration

Atlas Copco can take complete ownership of your O2 generation system, including the required filtration. Our PDp+ O2 filters protect the integrity and safety of your oxygen output, removing dust particulates as small as 0.01 micron. The range also includes the PDp+ O2 MS medical sterile/anti-bacterial version.



**Oil-Free oxygen booster O2: 10 Bar Oxygen booster**

Since many oxygen applications require higher pressure than 600 mBar (8 psi), Atlas Copco has a complete offer of 10 Bar (145 psi) oxygen boosters.



#### Tailor made solutions

We understand some applications or environments have specific requirements. Atlas Copco's engineered solutions department can tailorize the OGV gas generators to for example low ambient conditions, containerized solutions, special material requirements or special certifications.





# Technical specifications

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## Technical specifications

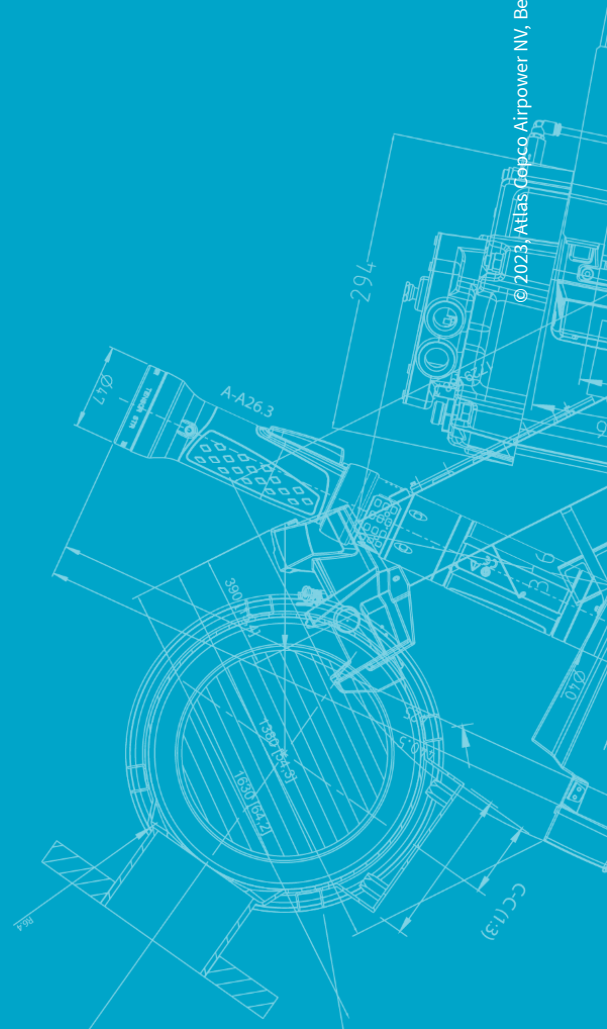
Model	Flow at 93% oxygen level				Dimensions			Weight	
	Nm3/h	scfm	kg/h	tons/day	W	D	H	kg	lbs
OGV80+	80	47	105	2.5	2477	2989	3609	4086	9008
OGV105+	105	62	138	3.3	2523	3042		4710	10383
OGV160+	160	94	210	5	2714	3233	3770	6432	14290
OGV270+	270	159	355	8.5	3578	3899	4037	10140	22354
OGV400+	400	235	525	12.6	3891	4260	4227	14090	31063

### NOTES:

- OGV+ can deliver purities from 80% to 94.5%. Consult Atlas Copco for specific sizing conditions
- Oxygen product pressure 600-800 mbarg (9-12 psig). Optionally 10 bar (145 psig) with booster



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