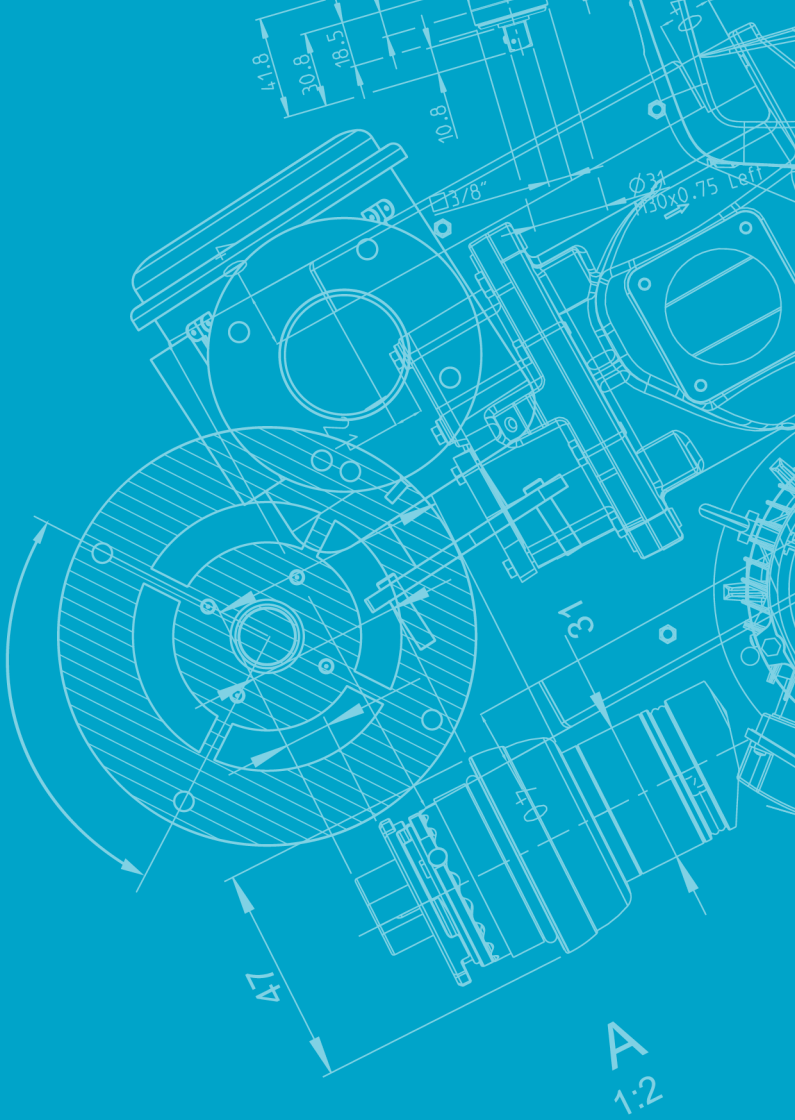


Oil-free screw blowers

ZS

18 – 315 kW
360 – 11750 m3/h
100 – 1500mbar(g)

24 – 422 hp
210 – 6915 cfm
1.45 – 21.8 psi(g)



1 Cover

3 Introduction

4 Markets & applications

5 Energy efficiency

7 Air quality

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9 Monitoring and control

11 Service

13 Performance

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High process uptime at low lifecycle cost

Energy costs can make up as much as 80% of a blower's lifecycle cost. That's why we continuously develop new blower models that consume minimal energy. The Atlas Copco oil-free screw blower element is driven by our in-house developed permanent magnet motor. Combined with the Neos VSD inverter, this proven energy-efficient variable speed solution performs reliably even in the harshest environments.



A sustainable replacement

Reduce your carbon footprint with our triple screw blower offer. Thanks to the internal compression process, you'll save at least 30% on energy consumption compared to your traditional lobe blower installation. From our price competitive ZS (VSD) L variants to the most energy efficient VSD screw blower on the market: there is always a variant that suited for your process and business model.



Durable and reliable design

For us, every design choice is driven by composing reliable and durable solutions. Excluding the need for maintenance on pullies and belts, and ensuring a long lifetime of the element, will surely reduce your service costs compared to a lobe blower installation.



Cool in any circumstances

Our permanent magnet motor housing is foreseen with a liquid cooled jacket to keep it cool in any circumstances. The oil pump is fully integrated ensuring exactly the right amount of cooled oil to the bearings and gears. Transmission from motor to screw element happens over a gearbox.



Ensured process uptime

Start securing your process quality and process uptime by selecting the highest guarantee on pure, 100% Class 0 certified oil-free air delivery. Fully operational, the **SMART**LINK monitoring system keeps you informed on-line on the machine-health, proposes pro-actively service interventions and advises you on the operational efficiency of the blower system.



Total solution packages fitting easily in your blower room

All our screw blower solutions are Plug & Play: no need to worry about having to scour the market for additional equipment to get your unit up and running. Thanks to its compact design, our units will fit perfectly into your existing blower room.

A complete package for all your applications

Built to ensure complete product safety, ZS blowers ensure a continuous, flexible, highly reliable and energy-efficient 100% oil-free air supply for all your low pressure applications.



Wastewater treatment

The process of purifying and recycling wastewater is usually a 24/7 one. Although the demand may be continuous, the amount of water to be cleaned may vary during the day. A blower with a built in variable speed drive will help you to adjust the amount of air to the actual demand. As up to 80% of the energy consumption of a site can be attributed to blowers in the aeration process, you'll need a blower with low operational costs.



Non-woven textile

The textile industry runs 24/7 in a continuous but changing process mode; the ZS easily handles the need for adjustable flow in order to influence fiber characteristic and does it in the most energy efficient way, fully exploiting the benefits of its permanent magnet motor at partial load. The screwblower's canopy is designed with care to ensure a low noise level. You don't need to foresee extra measures connecting the blower in your blower room: the units are ready and easy to use.



Pneumatic conveying

A reliable blower delivering you the right amount of air whenever you need it, is crucial for an efficient pneumatic conveying process. The higher the pressure and kW your system requires, the more you'll benefit from opting for a screw blower.



Fermentation

In the fermentation process, it is crucial to follow the exact fermentation recipe. This process needs accurate air flow control from minimum to maximum demand; the blower should in the meantime be able to handle an increasing pressure requirement over the fermentation cycle. Units with a variable speed drive are an efficient way to setup your system as they can run at every operating point.



Hull lubrication

Large vessels such as container ships or cruise ships often have a diesel engine that exhaust harmful gasses into the environment. Hull lubrication can help reduce sailing times and minimize the use of fuels and, ultimately, the exhaust of greenhouse gasses.

Creating a bubble curtain of compressed air bubbles at the bottom of the vessel, will reduce the friction rate between the ship and water and help reduce propulsion power, allowing the ship to sail faster at a lower diesel consumption rate.

Cost savings can be made if the saved propulsion power is larger than the required power for the air compression. Energy efficient blowers and compressors are thus key in achieving these savings. On top of that, since the air ends up in the ocean, class-zero oil-free air is a must.

As your vessels spend more than 90% of their time on the ocean, getting a service technician and spare parts on board for a not-planned intervention is not that obvious. Reliable equipment and a global service network are key in limiting downtime of the hull lubrication system.

The most energy-efficient solution

Up to 80% of a blower's life cycle cost is consumed by its energy usage. Energy-efficient technologies such as our ZS screw blower solutions ensure you low operational costs. We can offer you fixed speed, VSD and VSD+ units. Our multi-tier offer allows us to always offer you the most energy-efficient units for your needs.



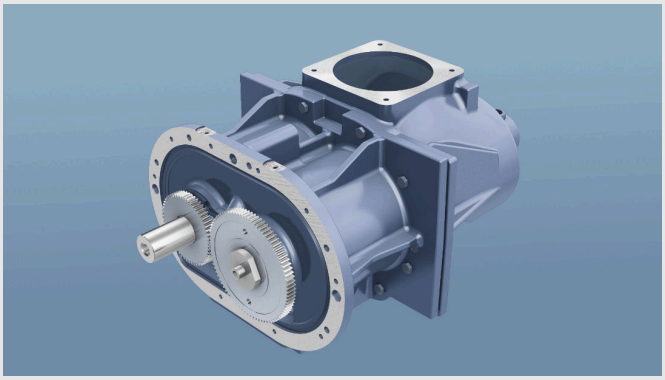
Our triple ZS offer: ZS L (VSD), ZS (VSD) & VSD+

Our **ZS L & ZS L VSD** units (our base offer) are our most cost-efficient screw blowers. At a competitive price range, they are a great and more sustainable alternative for your existing lobe blowers. On top of that, you'll also see a reduction in service costs: with the long lifetime of the element and without any belts and pulleys to worry about, only a minimum level of service is required.

An even more energy-efficient solution is to opt for a **ZS (fixed speed) or ZS VSD**. Our compact ZS & ZS VSD screw blowers have a pressure range up to 1.5 bar(g)/21 psig. Our ZS units are perfectly suited for processes with constant air demand, while our **ZS VSD** units have the ability to tune their motor speed and thus airflow delivery rate towards the requested set point. No energy is lost in compressing an excess of air. On top of that, the units have the highest available turndown range on the market. If you want to save even more on energy, we can offer you our premium **ZS VSD+** units. Our ZS VSD+ with a.o. the ultra-premium permanent magnet motor is a highly efficient solution that can help you cut even more operational costs.

Energy savings with ZS screw blower element

The ZS range has one of the most energy-efficient screw blower elements. The screw blower elements have optimized screw profiles and in- and outlet ports. This results in an efficient internal compression, together with the high-efficiency bearings and gears which can help you save up to 40% on energy consumption compared to lobe technology. The bearings of our oil-free screw blower elements are lubricated by cool oil. The cool oil is injected through tuned oil nozzles and forced by a mechanically driven oil pump. That assures just the right amount of cool oil at any rotational speed, which supports a very wide turndown capacity.





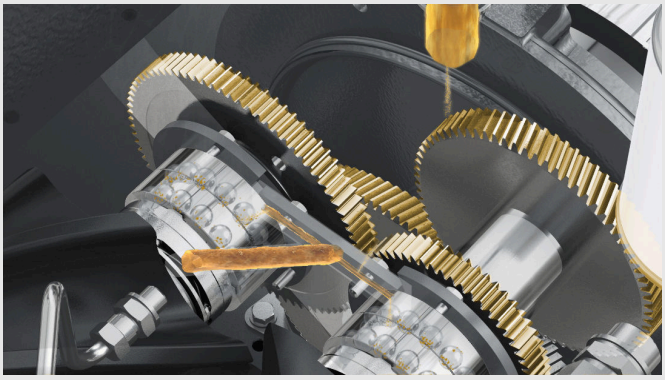
Even more energy savings with Variable Speed Drive technology

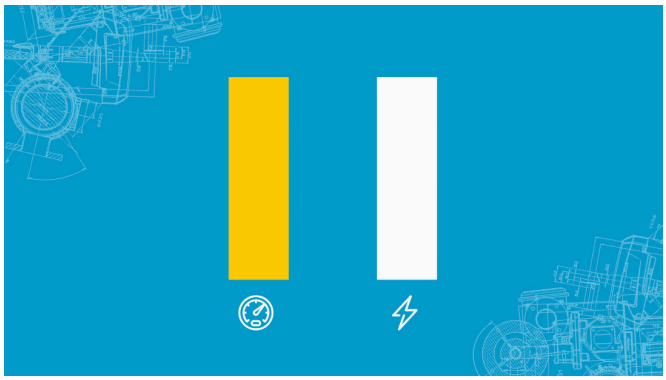
Processes with a variable air demand can benefit from having a Variable Speed Drive unit. Having a VSD unit can lead to major energy savings whilst it also protects the environment for future generations. Thanks to continual investments in this technology, we can offer you the widest range of integrated VSD blowers on the market.

Our ZS range is equipped with a Neos variable speed drive. Don't waste energy by choosing your required flow delivery: not only did we make the frequency drive more reliable, it also works at an optimal efficiency level.

Efficient transmission

A high-efficiency gear drive ensures minimal drive loss and an optimum speed selection for all pressure ranges. The gear transmission allows a high range of minimum and maximum motor speed, resulting in a very wide turndown range. To optimize that turndown, multiple gear sets are available for the different pressure variants. This will allow you to get the full ability of capacity of the blower element. The highly efficient gears ensure there will be no misalignment over time so no loss of efficiency. This results in 5% fewer losses compared to belt-driven units such as lobe blowers.



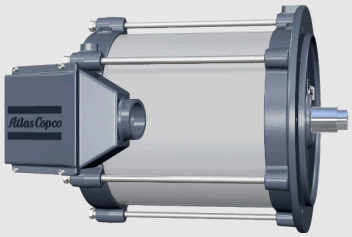


Minimized pressure drops

Friction is created when the air can't flow smoothly towards the element. This can cause pressure drops that can create a loss of efficiency. In fact, all losses before the element decrease the efficiency of the unit as the element needs to make up for these losses. It is thus crucial to avoid these pressure drops and maintain efficiency. Pressure drops in the air path are minimized because of the smart engineered baffling system and the high-quality air inlet filter. By measuring the pressure drop in the inlet system, the integrated controller (Elektronikon) can detect when the air filter is too contaminated. The Elektronikon will let you know when service on the filter is required so that your unit can keep running in optimal condition.

Highly efficient motors

ZS units are equipped with the most efficient motors in the market. Our ZS VSD⁺ are equipped with a permanent magnet motor. This helps you achieve an overall higher energy-efficiency level as no energy is lost in creating the secondary magnetic field. It also has a constant power factor, keeping motor efficiency constant throughout the whole motor speed range. That brings energy efficiency gains over the full turndown range of the ZS VSD⁺ unit! On top of that, the motor runs on oil-lubricated bearings, allowing also the motor to run at a maximum speed window. The permanent magnet motors are IE5 and NEMA ultra-premium efficiency classified. This not only helps you reduce your operational costs but also ensures you're equipment is in line with the latest energy consumption guidelines and regulations. The induction motors of the variable speed and fixed speed models are classified up to IE4 and NEMA super premium efficiency.



Class 0: the industry standard

Oil-free air is used in all kinds of industries where air quality is paramount for the end product and production process. These applications include food and beverage processing, pharmaceutical manufacturing and packaging, chemical and petrochemical processing, semiconductor and electronics manufacturing, the medical sector, automotive paint spraying, textile manufacturing and many more. In these critical environments, contamination by even the smallest quantities of oil can result in costly production downtime and product spoilage. Our Class 0 certified products ensure no oil is added to the air during the compression process.



First in oil-free air technology

Over the past sixty years Atlas Copco has pioneered the development of oil free air technology, resulting in a range of blowers that provide 100% pure, clean air. With our Class 0 products, no oil is added during the compression process, and thus provides you with 100% pure, clean air when the atmosphere doesn't contain any oil particles. Through continuous research and development, Atlas Copco achieved a new milestone, setting the standard for air purity as the first manufacturer to be awarded ISO 8573-1 Class 0 certification.

Eliminating any risk

As the industry leader committed to meeting the needs of the most demanding customers, Atlas Copco requested the renowned TÜV institute to type-test its range of oil-free compressors and blowers. Using the most rigorous testing methodologies available, all possible oil forms were measured across a range of temperatures and pressures. The TÜV found no traces of oil at all in the output air stream. Thus Atlas Copco is not only the first compressor and blower manufacturer to receive Class 0 certification, but also exceeds ISO 8573-1 Class 0 specifications.

The highest flexibility

Fitting our screw blowers into your system is easy: thanks to our plug & play packages with compact design, you'll have your process up and running in no-time.



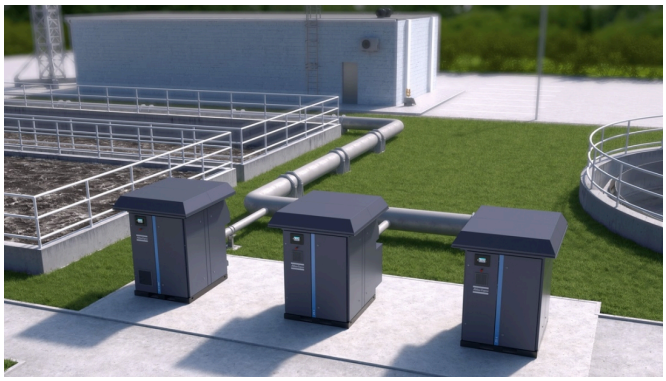
The smallest screw blower in the market

The new ZS VSD⁺ is really small. No issues anymore while replacing your old blower system with our screw blower. Ours will definitely fit in the same area. Also for new installations, this will help you to minimize your installation investments.



Side-by-side installation

Push it to the limits. Squeeze in as many ZS screw blowers as physically possible. The forklift slots are foreseen at the front; roll-in and park the blower in the row; interfaces for air outlet, (ducted) air inlet are at the back side, power cables can enter from the roof top. Once installed, operation is done from the front (or remotely), periodic maintenance is done from front and back.



Outdoor operation

No need for a dedicated blower room, no need for excessively long piping… You can install the ZS & ZS VSD⁺ screw blowers wherever you think it is the most convenient, using the bolt-on outdoor-kit. Are you placing your outside in a cold environment? Let us know what your site's conditions are so we can help you protect your equipment with a freeze protection and/or a freeze protection kit.



Separate process air inlet grating

All process air is taken through a single inlet grating, this makes it feasible to 'pipe' the inlet for better control.

How to get the best out of your installation

The Elektronikon® unit controller is specially designed to maximize the performance of your blowers under a variety of conditions. Optimizer 4.0 takes charge of the management of your full blower room. Key benefits are increased energy-efficiency by lowering energy consumption, reduced maintenance times and less stress… less stress for both you and your entire air system.

Elektronikon® MK5 Touch – Intelligence is part of the package

The full color touch display gives you an easy-to-understand readout of the equipment's running conditions.

- Clear icons and intuitive navigation provides you fast access to all of the important settings and data.
- Monitoring of the equipment running conditions and maintenance status; bringing this information to your attention when needed.
- Operation of the equipment to deliver specifically and reliably to your compressed air needs.
- Built-in remote control- and notification functions provided as standard, including simple to use integrated webpage.
- Support for 31 different languages, including character based languages.





Connectivity with SMARTLINK

Monitor your machines over the ethernet with the Elektronikon® unit controller and the **SMART**LINK service.

Monitoring features include warning indications, compressor shut-down, sensor trending and maintenance scheduling.

Go for enery efficiency: customized reports will be generated on the energy efficiency of your blower room, in compliance with ISO 50001.

Sit back and relax, Optimizer 4.0 has it under control

A properly managed compressed air network will save energy, reduce maintenance, decrease downtime, increase production and improve product quality. Atlas Copco's Optimizer 4.0 monitors and controls multiple blowers simultaneously; it is one central point of control for the whole compressed air network, ensuring all blowers provide optimum performance for your process. The result is a completely autonomous and energy-efficient network, giving you peace of mind and keeping your costs minimized.









Maximize your resources with a Service Plan

Optional maintenance will reduce the operational cost of your blower system. Operational efficiency is increased as our maintenance expertise makes life easier when it comes to resource management. Specialist services keeps your equipment running as it should, protecting your investment and guaranteeing high uptime and performance.

Blower parts at your doorstep: our Parts Plan

Genuine Parts, designed and produced to the exact specifications of your blower, delivered right where and when you need them.

- **All parts, one package** – Always have the needed part for your service intervention at hand.
- **Save money** – A Service Kit costs less than the sum of its components if ordered separately.
- **Less administration** – Every Service Kit has a single part number, allowing you to create a simple purchase order that is easy to follow up.





Fixed Price Services: best blower parts & maintenance

Avoid financial surprises. Our Fixed Price Services combine the expertise of factory-trained technicians with the quality of our genuine blower parts.

- **The best blower parts** – The unrivalled quality of our genuine parts results in optimal uptime, energy consumption and reliability.
- **An expert maintenance plan** – Rely on the expertise of factory-trained Atlas Copco technicians.
- **Clear and easy** – Tailored to your installation, site conditions, and production planning, every Fixed Price Service has a clear scope and price.

Preventive Maintenance Plan for optimal blower uptime

Rely on trained Atlas Copco technicians and the unrivalled quality of our genuine parts.

- **Service reports** – We help you achieve maximum energy efficiency by keeping you up to date of the status of your system.
- **Prevent breakdown** – If our technicians spot an additional developing problem, they will propose a solution.
- **Top-priority emergency call out system** – If an urgent repair is needed, you get priority assistance.





Complete blower care with our Total Responsibility Plan

We take care of all your blower maintenance, upgrades, repairs and even breakdowns for an all-inclusive price.

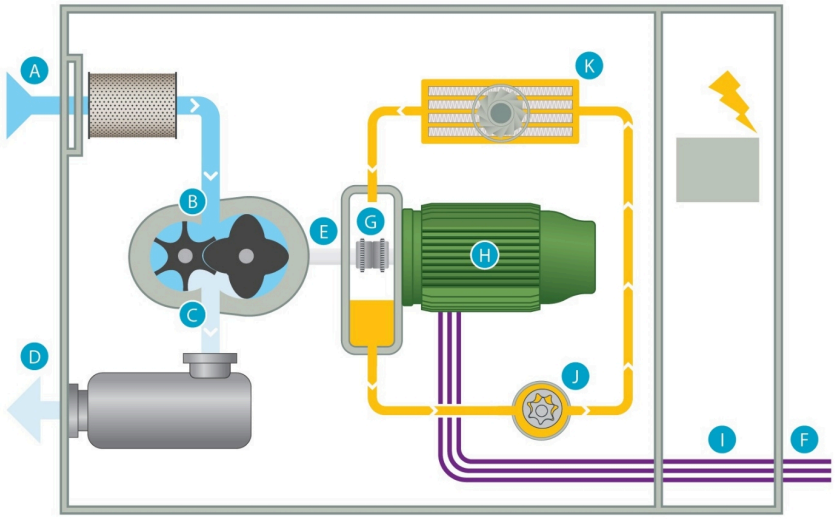
- **Complete blower care** – On-time maintenance by expert service engineers, genuine parts, proactive upgrades and blower overhauls.
- **Total risk coverage** – This means we take care of all your blower repairs and even breakdowns, without extra charges.
- **Ultimate efficiency** – Fitting the latest drive line components gives you as-new levels of compressor efficiency and reliability.

True package performance

In Atlas Copco, performance measurements and reporting are done according to the latest norm (ISO, CAGI etc) considering a full-scope blower. Performance is measured and reported as such:

Delivered flow: unit outlet flow at the customer's demanded pressure
Package power: fully demanded electrical power from the grid at this operating point

Delivered flow vs (element) inlet flow and package power vs shaft power are substantially different. Match the true blower performance with your actual need! Numerous test and reporting codes exist for blower performance. How to compare?



Legend

A. Inlet – package
B. Inlet – element
C. Outlet – element
D. Outlet – package
E. Shaft power
F. Package power
G. Mechanical drive
H. Motor
I. Electric drive
J. Oil pump
K. Oil cooler with cooling fan

Blue: Air
Light blue: Compressed Air
Yellow: Oil
Purple: Electricity

Core performance vs package performance

Some norms/codes discuss the performance of the 'core' of the blower, some of the 'full package'. Both are relevant, not the same though.

The core – or element – is the 'heart' of the blower; it is where the electric power is used to move air and build up pressure.

When integrated in a package; typically an inlet filter is installed upfront, a check valve and discharge silencer behind the element. Those auxiliaries generate pressure drops; next to that the element inlet flow will be at a higher temperature than the unit inlet grating. These effects result by definition in a "reduced" performance of the blower package compared to the core/element performance (higher power consumption for a lower mass flow).

Inlet flow vs outlet flow

Inlet flow = intake flow = suction flow = aspired flow
Outlet flow = delivered flow

What goes in must come out? That is not true. All blowers have some leak over the air seals; besides that, some blower technologies – by design – do not deliver all aspired air.

Why can inlet flow reporting be misleading? Often the inlet flow reporting is done based on an element/core suction flow measurement; as discussed in the section "core performance vs package performance", the (flow) performance measured at core-level by definition is better than the one at package-level. As customer it is important to compare the way how flow-performance is guaranteed vs the actual flow-rate demanded by the process (where is the flow 'needed'?).

Shaft power vs package power

Shaft power = mechanical power taken by the core/element to move/compress air from inlet to outlet (typically reported for core/element performance, referring to moving/compressing air from element inlet- to outlet flange)

Package power = full electric power taken by the blower package to move/compress air from package inlet to package outlet.

The difference between package power and shaft power is the sum of: transmission losses between motor and element (high for belts, low for gears, zero for direct drive), motor losses (depends on motor type, largely dependent on full/partial load operation!), electric drive (FS starter or VSD inverter losses) and auxiliaries (cooling fan, pump).

Plug & play unit

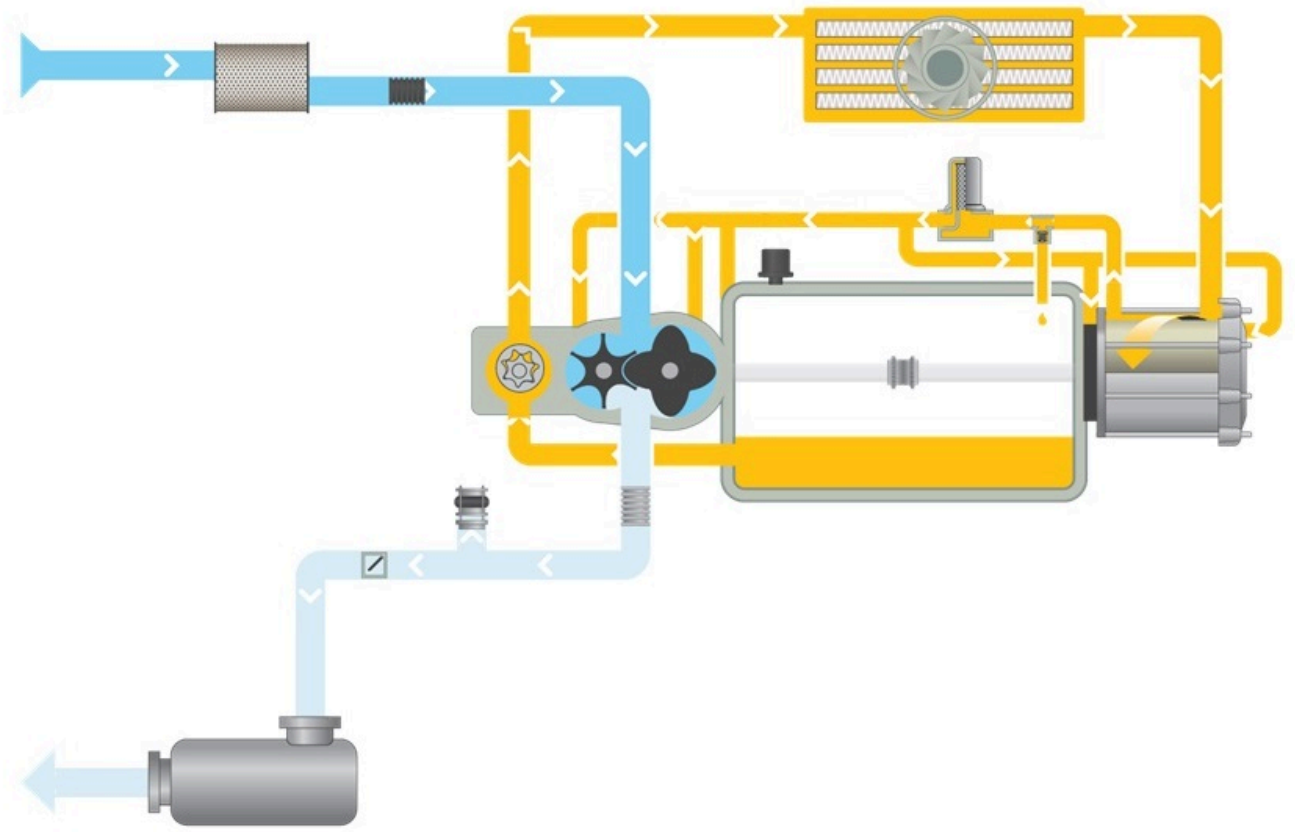
What is the scope of supply? This DOES have an impact on the performance guarantee.

Suppose package performance, based on outlet flow and package power is reported; then it still is very important to compare the scope of supply of the unit! Is there an inlet filter integrated in the package? Is there a check valve integrated? Is the VSD inverter integrated in the box? if not, are VSD inverter losses included in the reported package power?



Process, oil and cooling flows – a step by step guide

Flowchart ZS VSD+



1 Process flow

- Air intake with noise attenuating baffle system.
- Air is filtered prior to entering the screwblower element.
- Internal compression in the oil-free screwblower element.
- At start-up, the blow-off valve is 'open' for smooth unit start-up. That valve closes itself, pushed by the increased air pressure.
- As soon as the blow-off valve is closed, air pressure increases further, resulting in enough force to push the check-valve open.
- Discharge silencer reduces the pressure pulsation levels to the minimum.
- Air delivery to the system.

2 Oil flow

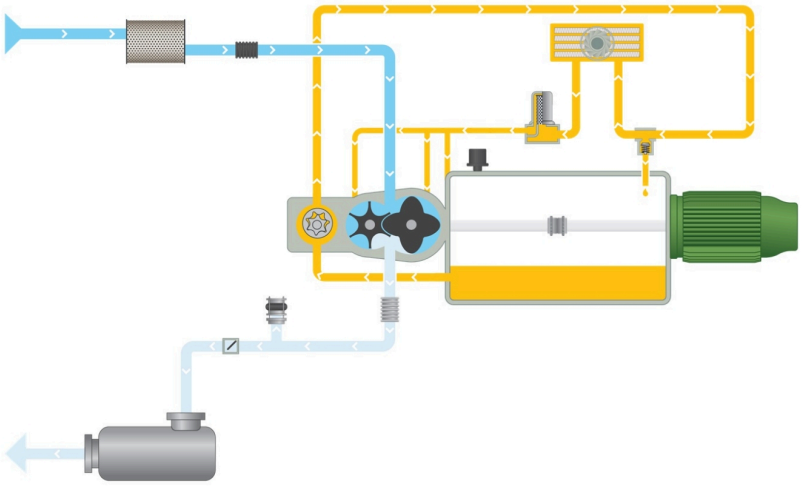
- Oil pump, mounted on screwblower shaft hence directly driven.
- Oil suction from carter, integrated in the gearbox.
- All oil is pumped to oil cooler; all oil is cooled.
- Cool oil flows through Permanent Magnet motor cooling jacket.
- Bypass valve decides exact oil flow that is required for bearing- and gear cooling and lubrication.
- That oil first is fine-filtered.
- Filtered cool oil is distributed to individually tuned oil nozzles per bearing and/or gear in screwblower element, gearbox and Permanent Magnet motor.
- Internal drains recover all oil in the carter (in the gearbox).

3 Cooling flow

- One cooling fan pulls the hot air out of the canopy.
- Fresh air is taken from the unit back side.
- That air first passes a noise attenuating baffle system.
- The cooling fan forces the canopy air through the oil cooler, taking away the heat of the oil. The hot air then leaves the canopy through the roof-top grating.
- The VSD cubicle is cooled with fresh air taken-in through filters in the front door.
- Cubicle fans push the hot air out of the cubicle, the hot air can leave the canopy through the same roof-top grating.

Flowchart ZS & ZS VSD

The process flow for our fixed speed and VSD model is identical to the VSD+.



Oil flow

The difference between the ZS VSD+ and ZS (VSD) is that, instead of oil being pumped to the oil cooler, a bypass valve decides exact oil flow that is required for bearing- and gear cooling and lubrication. That oil first is then pumped through the oil cooler and the cool oil is fine-filtered.

Cooling flow

The start of the ZS (VSD) cooling flow differs from the ZS VSD+, as a cooling fan pulls fresh air from the unit back side instead of pulling hot air out of the canopy. That fresh air is pushed through the oil cooler, taking away the heat of the oil. In parallel, the motor cooling fan also pulls fresh air from the unit back side. The motor fan-cowl ensures that air flowing over the motor cooling fins.

Technical specifications

Performance data

	Min. working pressure		Max. working pressure		Max. capacity FAD*		Min. capacity FAD*		Installed motor power	
	mbar(g)	psi	mbar(g)	psi	m^3/h	cfm	m^3/h	cfm	kW	hp
ZS 3 (VSD)	100	1.45	1200	17.4	1600	942	360	210	18-45	24-60
ZS 4L (VSD)	300	3.63	1000	14.5	3065	1004	389	229	37-75	50-100
ZS 4 (VSD) & ZS 4 (VSD^+)	300	3.63	1500	21.8	3250	1913	405	238	37-90	50-120
ZS 5 (VSD)	100	1.45	1500	21.8	5875	3450	1470	865	55-160	75-215
ZS 6 (VSD)	300	3.63	1200	17.4	11750	6915	3000	1765	132-315	177-422

** Unit performance measured according to ISO 1217, Annex C & E, Edition 4 (2009)*
Reference conditions:
- *Absolute inlet pressure 1 bar (14.5 psi).*
- *Intake air temperature 20°C (68°F).*

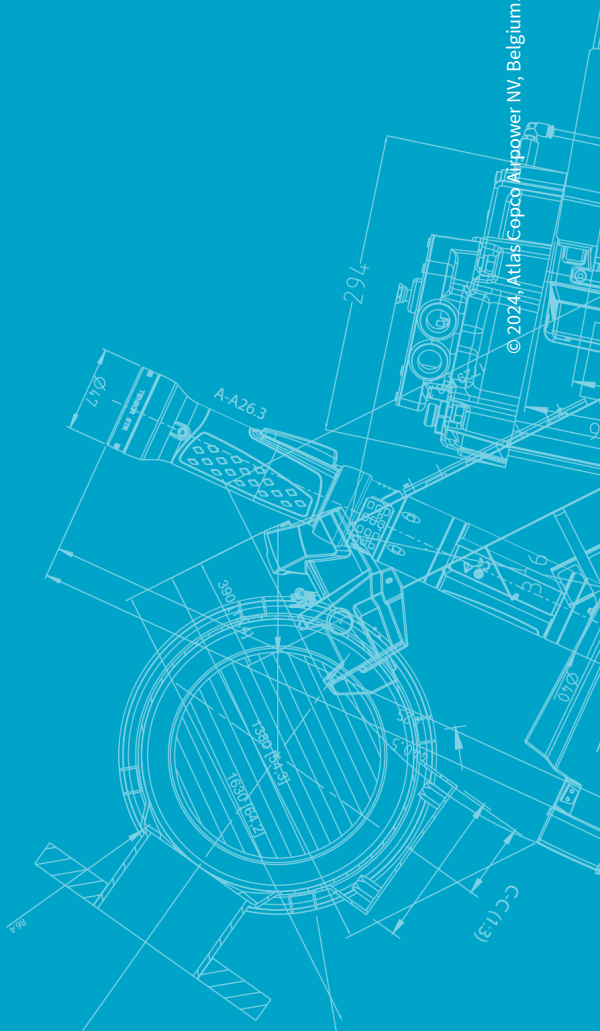
Dimensions & weight

	Length	Width	Height	Length	Width	Height	Weight(Max)	
	mm			inch			kg	lb
ZS 3 (VSD)	1236	1061	1435	49	42	56	856	1887
ZS 4L (VSD)	1910	1274	1690	75	50	67	1523	3357
ZS 4 (VSD) & ZS 4 (VSD^+)	1852	1250	1740	73	49	69	1776	3915
ZS 5 (VSD)	2600	1756	2100	102	69	83	3810	8400
ZS 6 (VSD)	3036	2132	2350	120	84	93	6500	14330


Atlas Copco
ZS 4 VSD+

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