Atlas Copco

Oil-free high-speed drive centrifugal compressor
ZH 350+ (350 kW / 470 hp)

Sustainable Productivity

Atlas Copco

Unmatchable energy efficiency and reliability

Atlas Copco's ZH 350+ oil-free centrifugal compressor is designed to save energy. The unique combination of optimal 3-stage compression, titanium impellers, the high-speed, high-efficiency motor, magnetic bearings and low pressure drops reduce energy consumption to previously unattainable low levels. This innovative compressor provides reliable operation in the most demanding environments. For optimum product quality, air is 100% certified oil-free according to ISO 8573-1 CLASS 0 (2010).

Manufacturing

A continuous flow of high-quality air

The demands placed on equipment in the manufacturing industry are very high. A dependable stream of 100% certified oil-free compressed air is crucial to keep the production up and running at all times. Atlas Copco's ZH 350+ compressor solutions operate dependably in extreme temperature and humidity conditions where high-performance levels and reliability are essential.

Electronics

Exceptional air quality and reliability

ZH 350+ compressors are ideally suited for electronics applications where moisture can affect sensitive processes and cause oxidation of micro-terminal strips, resulting in product failure. Similarly, microelectronics manufacturers depend on clean, dry air to remove microscopic debris from the surfaces of computer chips and computer boards. In such applications, the high reliability of ZH 350+ compressors is essential.

Pharmaceuticals

A tight control on quality and energy consumption

Pharmaceutical companies have a tight control on energy consumption and costs, which is why they frequently turn to the highly cost-efficient ZH 350+ air compressor from Atlas Copco. Pharmaceutical manufacturing plants also require clean air. Atlas Copco's ZH 350+ oil-free air compressor is certified according to ISO 8573-1 CLASS 0 (2010), which stands for zero risk of contamination, zero risk of damaged or unsafe products, and zero risk from operational downtime.

Automotive

Total reliability to keep processes running

To maximize productivity in the automotive industry, downtime has to be eliminated. Atlas Copco's reliable ZH 350+ air compressor stands for an integrated package that is designed for long-lasting performance. What's more, they are easy to install, operate and service.

Driving down energy costs

Atlas Copco is committed to offer the most energy-efficient technologies on the market. All components of the ZH 350+ are designed to save energy. The high-speed drive means no oil lubrication, no intermediate gears and fewer rotating components, all of which combine to reduce friction and drive down energy costs. The backward leaning impeller and the carbon ring air seals are designed to increase the operating range and provide the highest air volume with the lowest energy requirement.

Assuring your peace of mind

To maximize efficiency and reliability, the electronic controller controls the main drive motor and regulates system pressure within a predefined and narrow pressure band. The controller can be adapted to your specific needs with extra sensors, digital contacts, fieldbus, Internet and SMS communication functions. In combination with the ES multi-compressor controller, the operation of your complete compressor room is optimized.

Keeping your production up and running

All ZH 350+ components are easy to maintain, dismantle and re-assemble if required, thus increasing uptime. Advanced control and monitoring possibilities ensure that production interruptions are minimized. In addition, easily accessible major components, minimal service interventions and long overhaul intervals reduce maintenance time and costs.

Easy installation

The integrated design of the ZH 350+ includes air intake filter, coolers, internal cooling system, motor, and control system: all supplied as a ready-to-use package. Installation is fault-free, commissioning time is low and no external instrument air is required. You simply plug and run.

Protecting your reputation and production

ZH 350+ compressors provide you with 100% pure, clean air that complies with ISO 8573-1 CLASS 0 (2010) certification. CLASS 0 means zero risk of contamination; zero risk of damaged or unsafe products; zero risk of losses from operational downtime; and zero risk of damaging your company's hard-won professional reputation. Atlas Copco was the first manufacturer in the world to receive such accreditation on an oil-free compressor.

The top energy-saver

7 Closed loop water system with thermostatic valve

- Extended life time of electronic power components.
- Constant internal cooling water temperature.
- Independent of external cooling water quality.

6 Pre-mounted air intake filter with silencer

- Designed for very low pressure drop.
- Large surface area to cope with harsh environments.

5 Integrated blow-off valve with silencer

- Pre-installed before aftercooler within the package.
- No air expansion losses during unload operation.
- Reduced installation and space costs.

4 High-efficiency coolers with stainless steel tube bundles

- Very low pressure drop and enhanced heat transfer area.
- Fully epoxy-coated internal air path including the shells.
- High-efficiency condensate separation.

1 Three-stage compression

- More air flow per unit of power and broader operating range.
- High thermodynamic efficiency.

2 High-strength titanium impellers

- Permit frequent and fast load/unload transitions.
- Optimum strength to weight ratio leads to higher efficiency, rotor stability and reliability.

3 Two high-speed synchronous motors

- Frictionless magnetic bearings.
- Water-cooled jackets for effective heat dissipation.
- No gearbox, no oil lubrication required.

Control & monitoring

- To keep a firm grip on costs, the advanced control system allows you to monitor overall system performance with service indications, malfunction alarms and safety shutdowns. The multi-language text display is easy to use.
- Optional ES multi-compressor controller possibilities.

Superior energy efficiency

The ZH 350⁺ is Atlas Copco's most energy-efficient compressor, offering outstanding energy savings compared to conventional compressors.

6 Stable internal cooling temperatures

Stable internal cooling water temperatures extend the lifetime of electronic power components such as the frequency inverter and motor and increase drive efficiency for stable performance control.

5 Optimally sized coolers

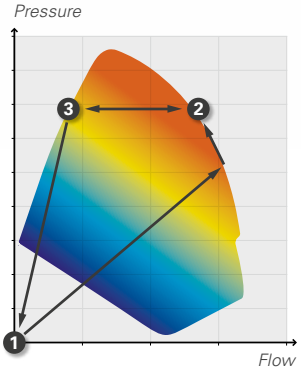
The design features an enhanced heat transfer area which has a positive impact on the operation and stability of the consequent compression stages. Minimum energy consumption during load/unload transitions is achieved by blow-off after the third stage before the aftercooler.
It de-pressurizes the compressor's internal air volume only between the compression stages, thereby ensuring minimal loss of compressed air.

4 Efficient drive

The ZH 350⁺ is directly driven by a permanent magnetic synchronous motor, which is vastly superior to conventional types. It reduces energy losses and cooling requirements and offers a higher speed in a more compact design. A consistently high motor efficiency with low rotor losses is maintained across the entire speed range both at full load and partial load. Whereas conventional motors need power to excite a magnetic field in the rotor, this is unnecessary in the ZH 350⁺ thanks to the permanent magnets in the rotor.

3 Titanium impellers for increased lifetime and lower power consumption

The ZH 350⁺ titanium impellers have superior fatigue properties and hence permit faster load-unload cycles. Reduced transition time between load-unload results in lower power consumption. The path of minimal energy consumption is followed. Further operating efficiency is achieved by speed regulation in the turndown zone.



Two optimal working points
1 Unload: 1.5%
2 Full load: 100%

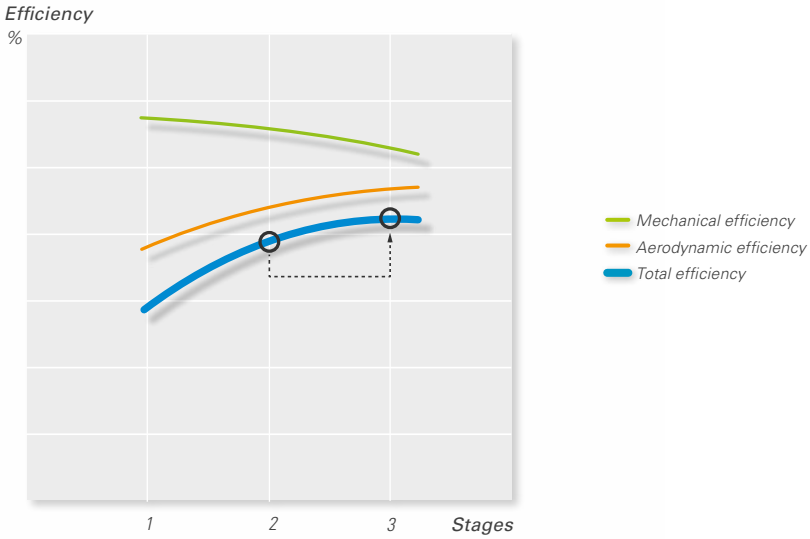
2 3 Efficient operation
By speed regulation in turndown zone

1 2 Fast acceleration
path of least power consumption

3 1 Fast deceleration
path of least power consumption

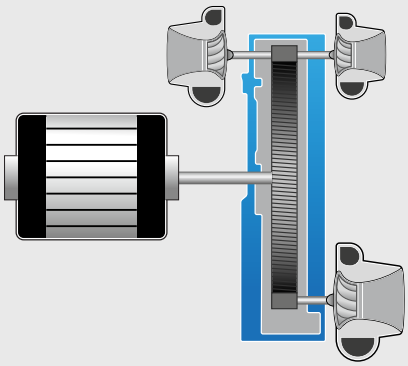
❶ Three-stage compression

The three-stage design of the ZH 350⁺ uses the best-performing technology currently available to achieve high thermodynamic efficiency and lower power consumption. A three-stage design is widely recognized as the most efficient design for achieving compression between 6 to 11 bar(e) / 90 to 160 psig with a turbo compressor, resulting in 4 to 9% more air flow per unit of power and a broader operating range. Coated stages and stainless steel diffusers provide excellent performance stability over time.

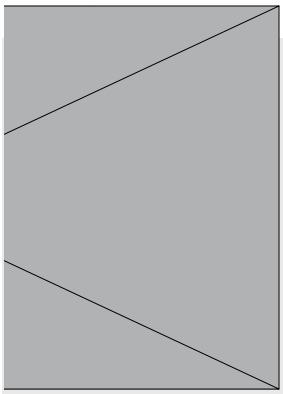


❷ No gears, no oil, minimal friction

The ZH 350⁺ completely eliminates the gearbox and therefore also the transmission losses normally associated with a gearbox, improving energy efficiency by up to 9%. No oil changes further limit operational costs. In addition, the compressor size is drastically reduced.



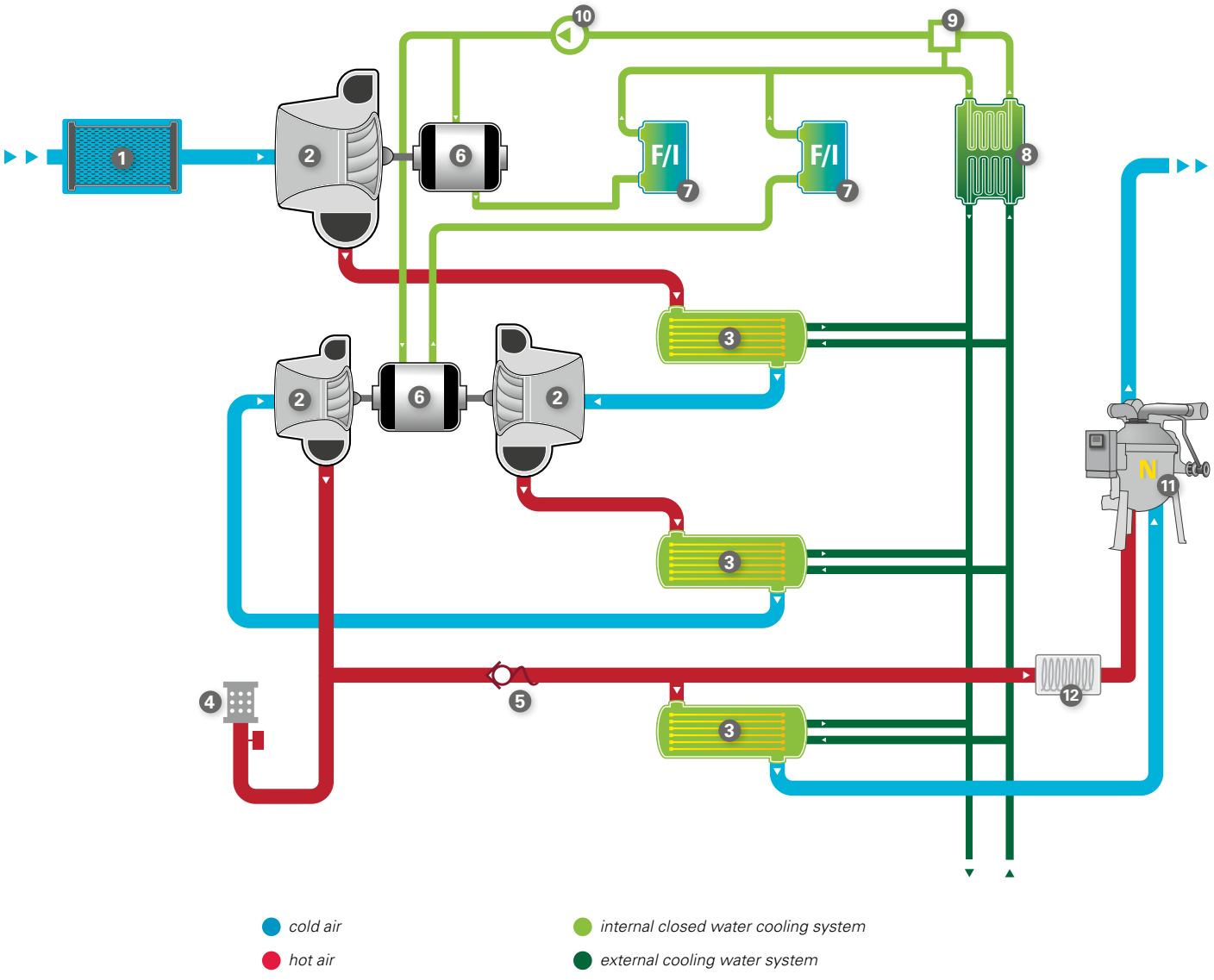
With gearbox
- High transmission losses
- Large footprint
- Lubrication required



Without gearbox (ZH 350⁺)
- Low transmission losses
- Compact design
- No lubrication, low maintenance

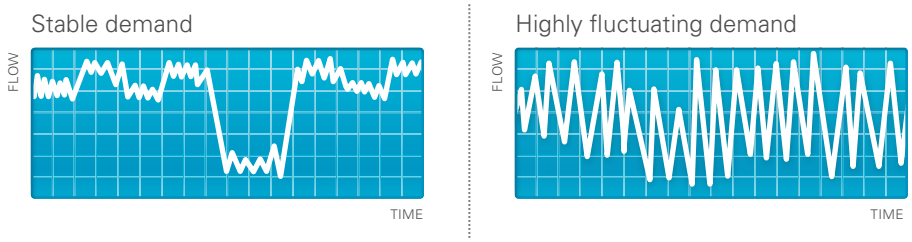
Working principle

The air enters the ZH 350⁺ via the air filter ❶ and then proceeds through three stages of compression ❷. After each stage, an inter- or aftercooler ❸ cools down the hot air. After the third stage of compression blow-off ❹ takes place before the check valve ❺ and aftercooler to rapidly de-pressurize the compressor's internal air volume during unload transitions. The three stages of compression are driven by two high-speed motors ❻ without a gearbox. The motors and frequency inverters ❼ are cooled in two parallel streams by an internal closed water cooling system, which features a thermostatic valve ❾ to maintain a constant water temperature and a water pump ❿ for water circulation. The internal closed loop cooling system is independent of the cooling water quality supplied externally. The cooling water is also distributed among the internal heat exchanger ❽. Optional components include Atlas Copco's ND heat-of-compression rotary drum dryer ⓫, and pre-heating of part of the hot air ⓬ after the third stage if required.

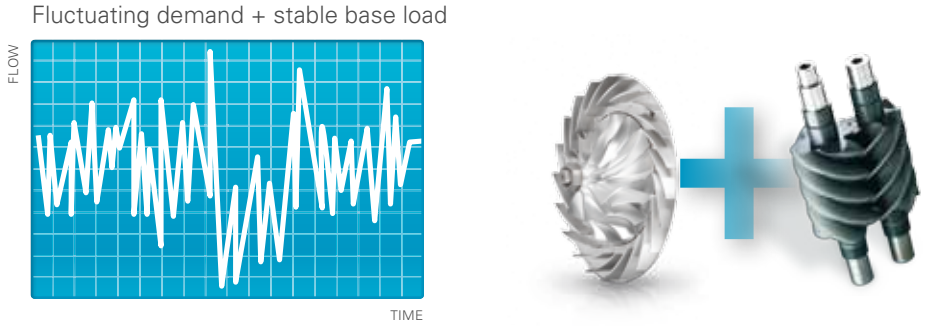


Optimize your compressor room

Thorough assessment of air flow demand profiles in the industry reveal that they can be either stable with limited fluctuations, highly fluctuating and hence less predictable or a combination of both. In all these cases Atlas Copco can offer you a suitable solution based on a combination of different compression technologies.



The ZH 350+ handles air demand fluctuations more effectively than turbo technology could do up to now. Its fast transitions between load and unload operation eliminate the need for expensive blow-down of compressed air in times of low air demand.



The combination of turbo and screw brings the energy bill further down in larger compressor rooms. While the Variable Speed Drive (VSD) screw accommodates the large fluctuations, the turbo efficiently takes care of the base flow requirements.

Contract Air

With Contract Air, Atlas Copco provides customers with compressed air or gas at specified pressure, dew point, purity, etc. It includes compressed air equipment, ancillaries, installation, full maintenance, repairs, spare parts and annual audits.

Major benefits:

- No investments needed.
- Compressed air cost matches consumption: only pay for the air you consume.
- Zero worries: uptime of equipment, air quality and energy efficiency are contractually guaranteed.
- Transparent costs: no breakdown costs, no stock of spare parts.
- Flexibility: choose your own payment options, contract duration and possible buy-ins.

For more information on Contract Air, please contact your local Atlas Copco representative.

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.

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 air compressors and blowers that provide 100% pure, clean air. 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.

CLASS	Concentration total oil *(aerosol, liquid, vapor)* mg/m^3
0	**As specified by the equipment user or supplier and more stringent than class 1**
1	< 0.01
2	< 0.1
3	< 1
4	< 5

Current ISO 8573-1 (2010) classes (the five main classes and the associated maximum concentration in total oil content).

CLASS 0 means:

Zero risk of contamination.

Zero risk of damaged or unsafe products.

Zero risk of losses from operational downtime.

Zero risk of damaging your company's hard-won professional reputation.

Scope of supply

Air circuit

- Air intake filter and silencer
- Impellers per stage
- Discharge check valve
- Integrated blow-off valve with silencer
- Compensator on air outlet (DIN / ANSI)

Cooling circuit

- Stainless steel inter- and aftercooler cores
- Integrated water-to-water cooler with stainless steel plates
- Thermostatic valve
- Single point inlet and outlet cooling water connection
- Compensators on cooling water inlet and outlet

Electrical components

- High-speed Permanent Magnet Synchronous Motor
- Pre-mounted control cubicle with control power transformer
- Advanced electronic control and monitoring system
- Frequency converters

Additional features

- Integral baseframe for compressor and drive
- Full acoustical sound attenuating enclosure
- Completely oil-less design
- Magnetic bearings for motor shaft
- Motor winding protection
- EMC tested and certified unit
- Energy-efficient no-loss electronic drains

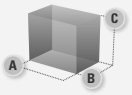
Options

- Hook up with central controller for multiple compressor installations
- Compatible with heat-of-compression rotary drum dryer, heat recovery

Technical specifications

50/60 Hz	Working pressure		Free air delivery (1)						Installed motor power		Dimensions					
	bar(e)	psig	l/s		cfm		m³/h		kW	hp	mm			in		
			Min	Max	Min	Max	Min	Max			A	B	C	A	B	C
ZH 350+	6-9	87-130	700	1100	1483	2330	2520	3960	350	470	2400	2000	2017	94.49	78.74	79.42

(1) Free air delivery and power according to Acceptance Test Code for Electrically Driven Packaged Centrifugal Air Compressors. CAGI bulletin 006-11, January 2011 or Pneurop publication PN2-01, November 2010.



Driven by innovation

With more than 135 years of innovation and experience, Atlas Copco will deliver the products and services to help maximize your company's efficiency and productivity. As an industry leader, we are dedicated to offering high air quality at the lowest possible cost of ownership. Through continuous innovation, we strive to safeguard your bottom line and bring you peace of mind.

Building on interaction

As part of our long-term relationship with our customers, we have accumulated extensive knowledge of a wide diversity of processes, needs and objectives. This gives us the flexibility to adapt and efficiently produce customized compressed air solutions that meet and exceed your expectations.

A committed business partner

With a presence in over 170 countries, we will deliver high-quality customer service anywhere, anytime. Our highly skilled technicians are available 24/7 and are supported by an efficient logistics organization, ensuring fast delivery of genuine spare parts when you need them. We are committed to providing the best possible know-how and technology to help your company produce, grow, and succeed. With Atlas Copco you can rest assured that your superior productivity is our first concern!

Atlas Copco

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