

# TURBO BLOWER

## AERZEN TURBO G5 AND G5<sup>plus</sup>

Intake volume flows of 300 m<sup>3</sup>/h to 16,200 m<sup>3</sup>/h



**AERZEN**

# AERZEN TECHNOLOGY

## ALWAYS ONE INNOVATION AHEAD.

In a time of fiercely contested markets and increasing competition, a company with 150 years of history has become a rarity. Today, AERZEN is one of the few family-owned companies that remains well known for consistent quality and powerful innovations. The impressive performance of Aerzen's latest Generation 5 and 5<sup>plus</sup> turbo blowers proves this once again, setting new standards in reliability and energy efficiency.

### **AERZEN – A tradition of innovation**

Founded in 1864, today Aerzener Maschinenfabrik is a world leader in compressor technology. Used in countless applications, AERZEN positive displacement blowers, turbo blowers, and screw compressors have been renowned worldwide for decades. A dedicated R&D department ensures that AERZEN technology undergoes continual development. Pioneering innovations developed by the department, such as Delta Hybrid, the world's first rotary lobe compressor, and the Aerzen Turbo with air bearings, have exerted a major influence on technological progress. It is all in keeping with our company's motto: 'Expect performance'.

### **Energy consumption: a key issue in the future**

With increasing demand for resilient, lasting technology that offers minimal energy consumption and high performance, rising energy costs and dwindling resources are of greater concern to companies, researchers, and end users now more than ever before. The increasing scarcity of resources gives particular cause for concern. Basic industrial processes are associated with some of the highest energy costs. Processes

involving pumps and compressors, regardless of type, account for the highest percentage of total energy costs – 30%. This affects wastewater treatment applications as well. The treatment of wastewater in aeration tanks consumes a staggering 60% to 80% of the total energy required by a wastewater treatment plant. It is high time to construct a future with technologies based on low energy costs and sustainability.

### **The right solution for every application**

AERZEN successfully introduced its innovative, air bearing turbo blower to the market in 2010. Today, more than 1000 installations worldwide attest to its superior reliability, and low energy and maintenance costs. AERZEN's turbo blowers are used for a wide range of different applications, including oxygen supply in the biological processes of wastewater treatment plants, fermentation in yeast production, providing oxidation air for lime and cement production, and many more...





WHEN IT COMES TO TURBO TECHNOLOGY, AERZEN'S AIR BEARING TURBO BLOWERS ARE PIONEERS.

# MAXIMUM EFFICIENCY. PERFECTLY ATTUNED COMPONENTS.

AERZEN manufactures and develops all of its products via in-house production. The advantages are obvious. Only this working method allows us to ensure components are perfectly matched to each other and can be ideally adapted to the operating process. The result is unparalleled durability, operational reliability, and cost-effectiveness, flawless operation around the clock, and maximum productivity at reduced operating costs.

## **Designed for perfection: the impeller design**

What distinguishes a turbo impeller from an AERZEN turbo impeller? Basically everything. Take the design, for example. The AERZEN Turbo is the result of complex CFD-supported flow analyses. The shape of every impeller is optimally designed for the corresponding performance class. As a result, AERZEN turbo impellers are significantly more effective than those that are adjusted only for a few parameters, such as the diameter. Another distinguishing feature of AERZEN impellers is the material: they use stainless steel instead of aluminium. From a pure design standpoint, this material allows for vast improvement in aerodynamics. Stainless steel is a win not only for efficiency, but also for durability and sustainably low life-cycle costs. That's because stainless steel is corrosion-resistant and practically abrasion-free.

## **Efficient, intelligent, and future oriented: The AERZEN frequency converter**

The innovation: AERZEN frequency converters based on multi-level topology. The converter power stage has a three-level structure, effectively halving the DC-

Link voltage per switching cycle. As a result, heat loss in the drive motor is reduced to a minimum, leading to a decisive improvement in overall system efficiency.

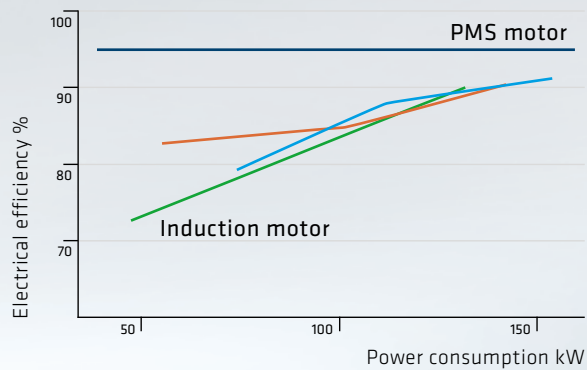
Another advantage of Aerzen's multi-level design is that it eliminates the need for an additional motor choke or the sine wave filter that is required for standard frequency converters. Furthermore, the AERZEN frequency converter offers considerably faster performance, thanks to special high-rise-to-surge technology (active surge protection).

Compared to turbo blowers with standard converters, turbo assemblies from AERZEN are less sensitive to pressure fluctuations, and more responsive. As a result, AERZEN Turbo assemblies can be operated with far greater stability throughout the entire turbo range, which also happens to provide a basis for the reliable combination of positive displacement and turbo machines. All parameters are measured constantly to prevent the compressor surge that can occur with unexpected pressure fluctuations. This gives the AERZEN frequency converter a decisive advantage in operational reliability and energy efficiency.



*The AERZEN Turbo impeller*

**Induction and PMS motor comparison**

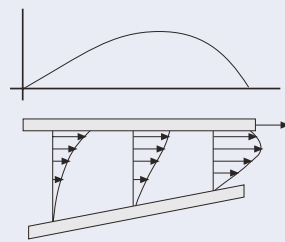
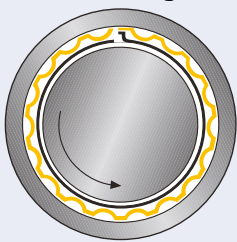


#### Powering innovation: the PMS motor

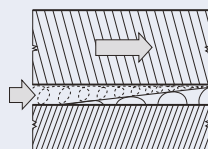
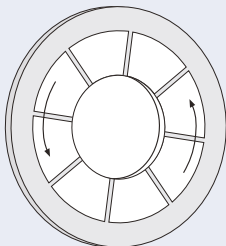
The Aerzen Turbo is powered by a special motor. It's called a permanent magnet synchronous motor, or PMS motor for short. Its main characteristics: It is extremely efficient, energy-saving, highly innovative, and far superior to conventional motors. Why? Because AERZEN developed this motor specifically for its turbos. Because the rotor doesn't require

any additional energy for its magnetisation. Because, like the AERZEN frequency converter, it was designed to meet the special high frequency and response-time requirements of turbo technology. And finally, because this motor demonstrates exceptional performance and a high power density with an outstanding efficiency of 96%, even in partial load operation.

**Radial bearing**



**Thrust bearing**



#### Capable of absorbing any pressure fluctuation: Air foil bearings for the PMS motor

The AERZEN PMS motor comes equipped with air foil bearings. For a particular reason. Borrowed from the aerospace industry, this technology is extremely simple in construction and convincing in operation. A cushion of air is created as soon as the shaft begins to rotate. AERZEN has now taken this technology one decisive step further. Made of graphite and Teflon, our new, double-coated air foil bearings offer increased temperature resistance and a longer service life. Rather than facing problems associated with magnetic bearing systems and standard air foil technology, this type of bearing offers numerous advantages:

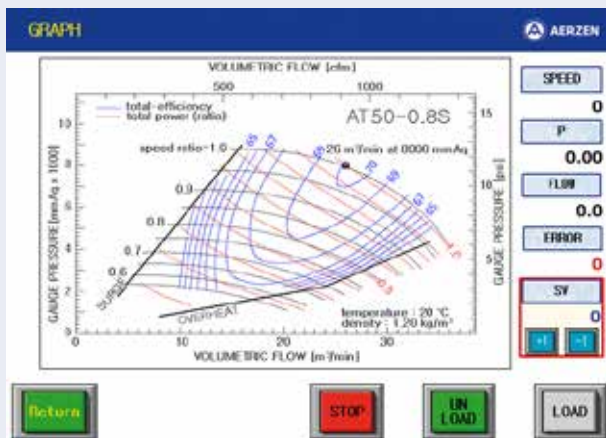
- Uncomplicated, closed system
- Contact- and vibration-free operation
- Theoretical bearing lifetime of >80,000 operating hours, regardless of stop and start cycles (>80 starts/stops per hour)
- No components susceptible to wear
- 100% maintenance- and oil-free
- Able to withstand even large-scale pressure variations (for example, SBR processes and pulsations from positive displacement machines).



# RELIABILITY, CONVENIENCE, AND TRANSPARENCY: THE TURBO CONTROL SYSTEM

The reason we chose to develop the hardware especially for our high-efficiency turbo rather than rely on a standard control system. The result is a fully integrated digital system with unrivalled functionality Convenient use via the touchscreen. and equipped with all the relevant interfaces, for example, for your SCADA system.





### Real-time transparency:

The Aerzen Turbo control system integrates all the parameters of the turbo blower with the corresponding permissible minimal and maximal values (surge limit, maximal speed, overload, etc.):

- Differential pressure of the intake filter
- Differential pressure
- Volume flow
- Intake and discharge temperature
- Speed
- Electrical rating
- Operating hours
- Warnings, error codes, and error history
- Live visualisation inside the turbo performance map

### Actual volume flow measurement.

When it comes to high-performance, reliable plant operation, we don't like to compromise. That's why with the Aerzen Turbo we don't take the conventional, indirect route of measuring volume flow from the blower's power consumption. Instead, we measure it for real, based on the Venturi effect. To be precise, the actual volume flow is measured at the inlet cone, based on a measurement of the generated differential pressure. This approach is unrivalled and has decisive advantages. On the one hand, it means the assembly uses real values for its safety system, for example, the AERZEN High-Rise-to-Surge feature (active surge protection). On the other, our customers know at any point the actual air quantities that they are putting into their aeration tanks (this parameter is displayed for you directly via the software).



### Comfort written large

From comprehensive analysis tools and a multitude of security features to modern interfaces, the Aerzen Turbo control system leaves nothing to be desired.

Date	UP	R	C	I	CHARGE	T1	T2	SPEED	POWER	ERROR	CHG	SV
2014/10/28 12:51:49	0	0	0	0	520	33	5	0	0	236	38	27
2014/10/28 10:46:43	0	0	0	0	519	32	46	0	0	236	29	53
2014/10/28 10:28:27	7	11	313	11	519	26	44	1100	7	240	564	53
2014/10/28 10:27:50	7	11	313	11	519	26	44	1100	7	240	563	53
2014/10/28 10:26:18	7	11	313	11	519	26	45	1100	7	240	563	53
2014/10/28 10:26:00	7	11	313	11	519	26	46	1100	7	240	563	53
2014/10/28 10:25:41	7	11	313	11	519	26	46	1100	7	240	563	53
2014/10/28 10:25:32	7	11	313	11	519	26	47	1120	7	240	563	53
2014/10/28 10:24:00	8	14	343	14	519	26	53	1180	9	240	562	53
2014/10/28 10:23:32	12	23	437	35	519	26	60	1520	22	240	556	53
2014/10/28 10:23:23	14	26	467	43	519	26	63	1600	27	240	555	53
2014/10/28 10:22:27	21	63	595	107	519	25	82	2160	66	240	553	53
2014/10/25 00:12:00	7	12	305	11	456	23	41	1100	7	240	560	57
2014/10/25 00:11:51	7	11	311	11	456	23	41	1100	7	240	560	57
2014/10/25 00:11:23	7	12	311	11	456	23	41	1100	7	240	560	57
2014/10/25 00:11:14	7	12	311	11	456	23	42	1100	7	240	560	57
2014/10/25 00:09:42	7	12	305	11	456	23	44	1100	7	240	561	57
2014/10/25 00:09:05	7	12	305	11	456	23	46	1100	7	240	560	57
2014/10/25 00:08:56	7	12	299	11	456	23	47	1100	7	240	550	57
2014/10/25 00:06:56	24	53	677	122	455	24	77	2200	76	240	551	51
2014/10/23 15:42:50	0	0	0	0	424	24	26	0	0	236	29	58

### Communication interfaces:

Profibus, Modbus, Ethernet IP, Profinet, direct connection to an oxygen probe and analogue signals (4-20 mA).

### Safety features

- Unique AERZEN ASP software (Automatic Surge Protection). Automatic control of blower speed when surge limits and critical operating ranges are reached
- Constant monitoring of all relevant operating parameters (for example, pressure, temperature, speed, etc.)

### Tools for Analysis

Fault log with operating values, trend curves, and data loggers for motor and frequency converters.

# AERZEN TURBO G5.

## THE PLUG & PLAY CONCEPT

Simply connect and start. It's that simple. After all, your Turbo package has already been fully configured and assembled at the factory, and is ready to connect and operate at the installation site. Tailored to your exact process requirements, of course. Turbo convenience from day one. Typical of AERZEN, and one reason why the Turbo will be well received at your plant.

### Ready to connect: scope of supply in the standard version

- 1 BOV (Blow OFF Valve)**
- For discharging air during start-up and shut-down processes

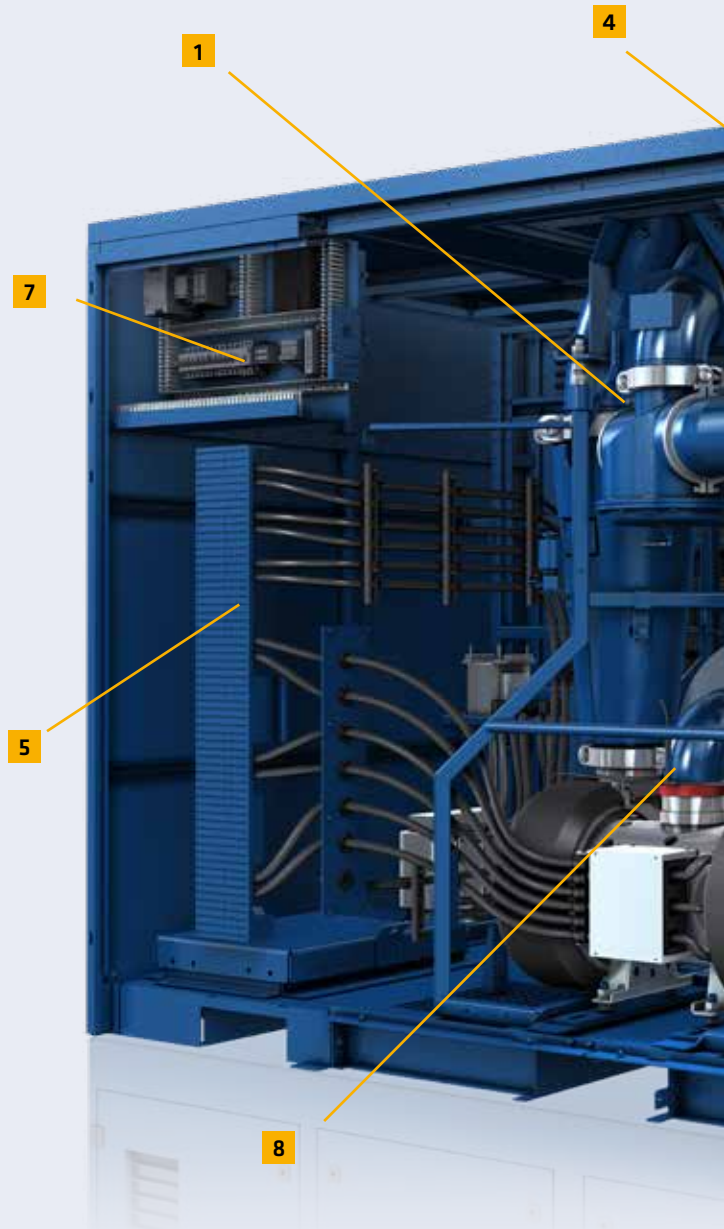
- 2 Process filter**
- Excellent accessibility
  - Easily changeable filters

- 3 Cooling fan**
- Well adapted and energy-efficient cooling of the main motor
  - Optional use of motor heat



- 4 BOV silencer**
- Significant reduction in exhaust noise

- 5 Frequency converter**
- Fully integrated, including line reactor for reducing circuit feedback
  - With retractable cabinet and RFI filter (optional)



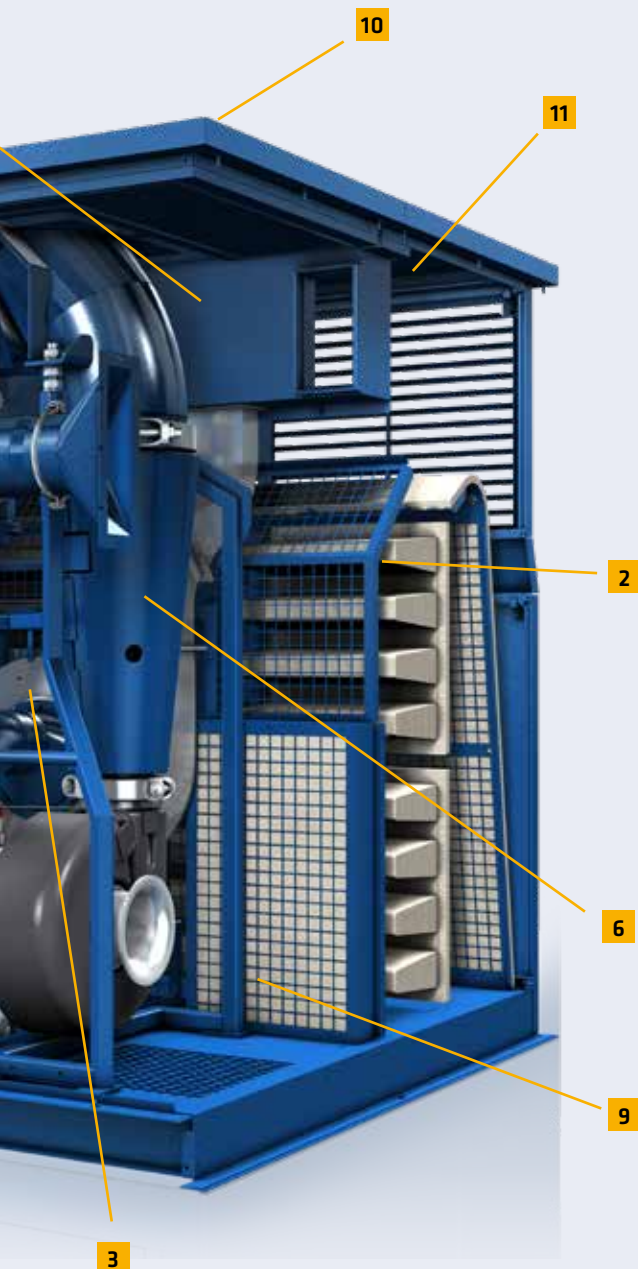


#### Perfect additions:

##### accessories, modifications, and extensions.

- Easy and cost-neutral conversion of machine room and ducted inlet
- Check valve optimised for reduced pressure loss

- Bellow type expansion joint with internal conduit tube
- Discharge silencer for reducing piping noise
- Transformer for 500 V - 700 V applications
- Special solutions for high ambient temperatures > 45°C



#### 6 Cone diffuser

- Flow-optimised pressure generation

#### 7 Aerzen Turbo control system

- Reliable, convenient, and transparent



#### 8 Turbo motor

- Twin configuration, two blower stages on each shaft end
- Air foil bearing, impeller, and PMS motor
- Integrated airflow measurement



#### 9 Intake silencer

- Flow-optimised and noise-reducing process airflow

#### 10 Compensator (optional accessory)

- For stress-free connection of the piping on the discharge side

#### 11 Optional

- Suction via inlet air duct

# AERZEN TURBO G5<sup>plus</sup>.

## MORE COMPACT, GREATER EFFICIENCY, BETTER.

Again and again, AERZEN has set new records with its forward-looking solutions. A case in point is our new Turbo generation, Aerzen Turbo G5<sup>plus</sup>. The Plus means greater compactness, as well as optimal efficiency and durability. Aerzen Turbo G5<sup>plus</sup>, the most compact and efficient Turbo in its class. Experience innovations that will make all the difference. Turbo technology from AERZEN.

Ready to connect: scope of supply in the standard version



**1 BOV (Blow OFF Valve)**

- For discharging air during start-up and shut-down processes

**2 Process filter**

- Excellent accessibility
- Easily changeable filters



**3 Motor cooling**

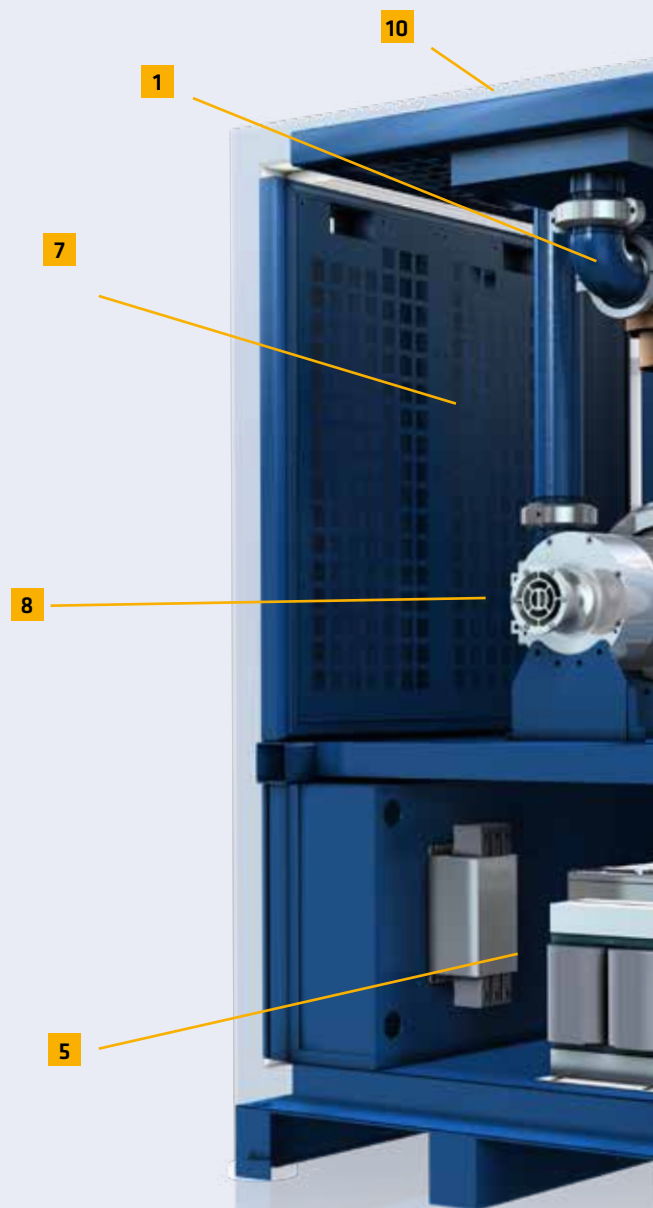
- Via integrated fan impeller on the motor
- Optional use of waste heat

**4 BOV silencer**

- Significant reduction in exhaust noise

**5 Frequency converter**

- Fully integrated, including line reactor for reducing circuit feedback
- With RFI filter (optional)

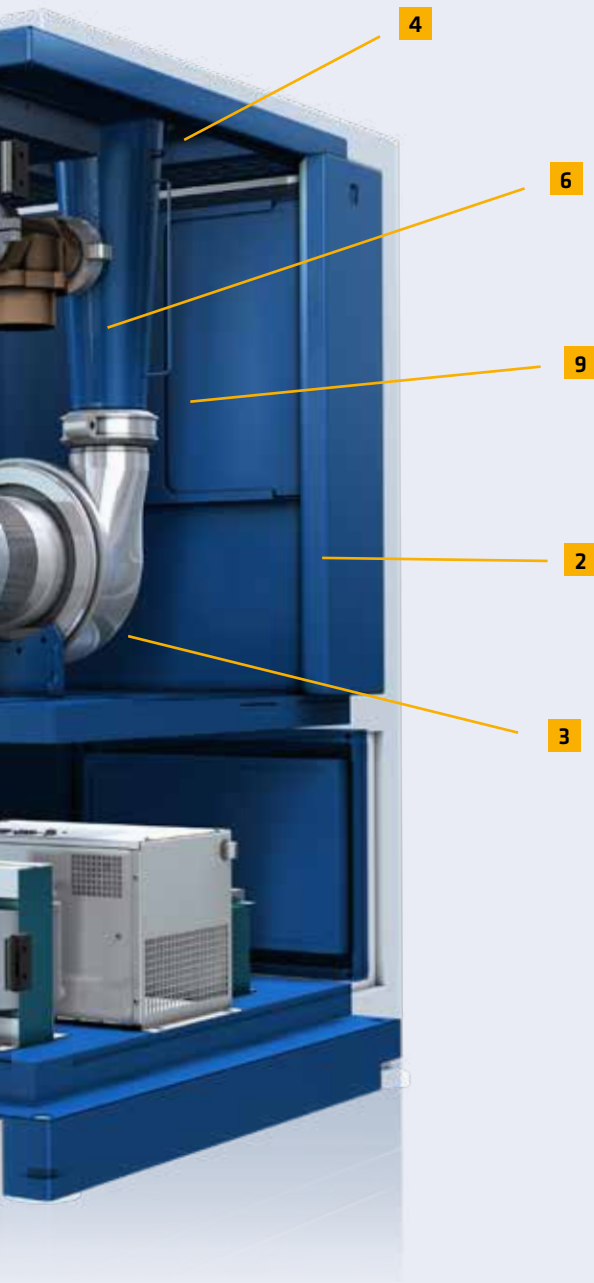


#### Perfect additions:

##### accessories, modifications, and extensions.

- Easy and cost-neutral conversion of channel inlet and piped inlet
- Check valve optimised for reduced pressure loss

- Bellow type expansion joint with internal conduit tube
- Discharge silencer for reducing piping noise
- Transformer for 500 V - 700 V applications
- Special solutions for high ambient temperatures > 45°C



#### 6 Cone diffuser

- Flow-optimised pressure generation

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#### 8 Turbo motor

- Air foil bearing, impeller, and PMS motor
- Integrated airflow measurement

#### 9 Intake silencer

- Flow-optimised and noise-reducing process air guiding

#### 10 Compensator (optional accessory)

- For stress-free connection of the piping on the discharge side



# THERE'S A LOT TO SAY ABOUT THE ECONOMICAL AERZEN TURBO. WE'LL MAKE IT BRIEF.

AERZEN has built turbo blowers since 1911. Over the years, we've continued to perfect the technology of our assemblies. Along the way, we've developed expertise that today sets standards worldwide. This is reflected in all the performance characteristics, every component, and all the details of the newest Turbos. Discover the new Turbo Generation 5 and Generation 5<sup>plus</sup>.

## 100% Turbo

- For small and large volume flows
- From 300 m<sup>3</sup>/h to 16,200 m<sup>3</sup>/h
- Speed-controlled
- 100% oil-free

## Efficient peak values

- Improved energy efficiency by up to 10% compared to conventional turbo technology
- Control range of 40% - 100%
- Highly efficient individual components

## Powering innovation: the permanent magnet motor

- Extremely efficient and energy-saving permanent magnet motor
- Requires no additional energy to magnetise the rotor
- Outstanding efficiency of an almost constant 96%, even in partial load operation

## Innovative AERZEN air foil bearings

- Forward-thinking double coating made of Teflon and graphite
- Theoretical bearing lifetime of >80,000 operating hours, regardless of stop and start cycles (>80 starts/stops per hour)
- Resistant to pressure peaks (for example, SBR processes, pulsations caused by positive displacement machines) and compressor surge
- Highly functional without necessary accessories (for example, electric control system, back up bearings, auxiliary electronics such as battery systems), highly reliable operation even during voltage fluctuations and power supply failures.
- 100% maintenance free

## Convenient scope of supply

- Assembled and ready to connect
- Slight modifications for channel or piped inlets
- Diverse range of accessories





#### Direct volume flow measurement.

- Real measurement based on the Venturi effect

#### New multi-level frequency converter (>55kW)

- High efficiency rating, up to 90% less power loss in the motor compared to conventional converter technology
- No need for a motor choke or sine wave filter
- Low temperature generation on the motor side, resulting in high reliability
- Consistent air cooling, expanded field of application for up to 50° ambient temperature
- Active surge protection (high-rise-to-surge)  
Speed control based on motor current
- Can be used reliably in combination with positive displacement machines

#### Convenient Turbo control system

- Integrated real-time transparency, display of all parameters including live visualisation of the Turbo performance map.
- Real airflow measurement for increased transparency and operational reliability
- Advanced AERZEN 'Automatic Surge Protection' software, active surge protection via automatic speed control
- Universal interface

#### The impeller design

- High efficiency due to optimised design
- Improved aerodynamics, corrosion resistant and practically abrasion-free thanks to the use of stainless steel

#### Low space requirements

- Reduced dimensions: Existing blowers can be exchanged quickly and easily (series G5<sup>plus</sup>)
- Small machine room dimensions

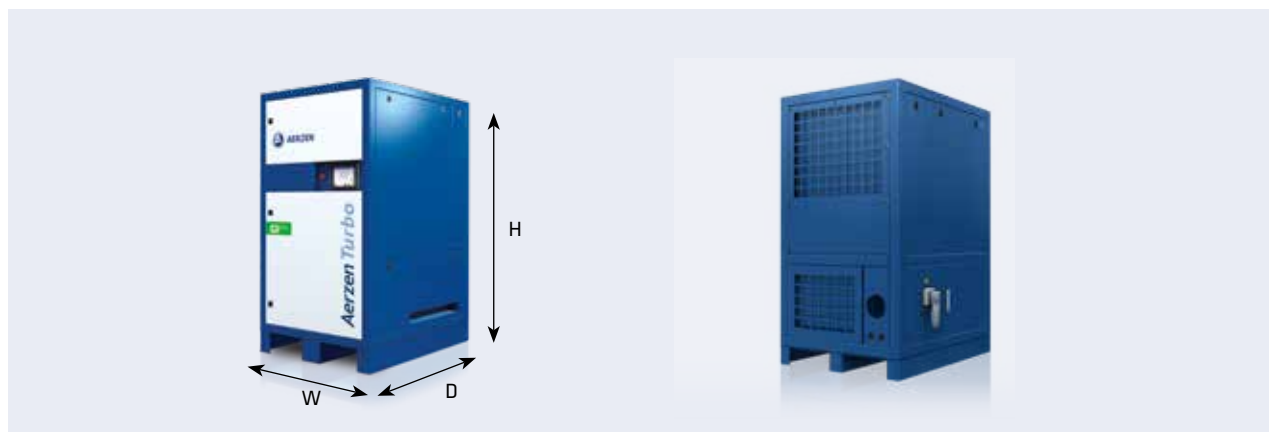
#### Intelligently designed:

- Easy transport, installation, and commissioning
- Reduced sound pressure level, on average < 75 db(A)



# EFFICIENCY AS A MATTER OF FACT THE TURBO IN NUMBERS.

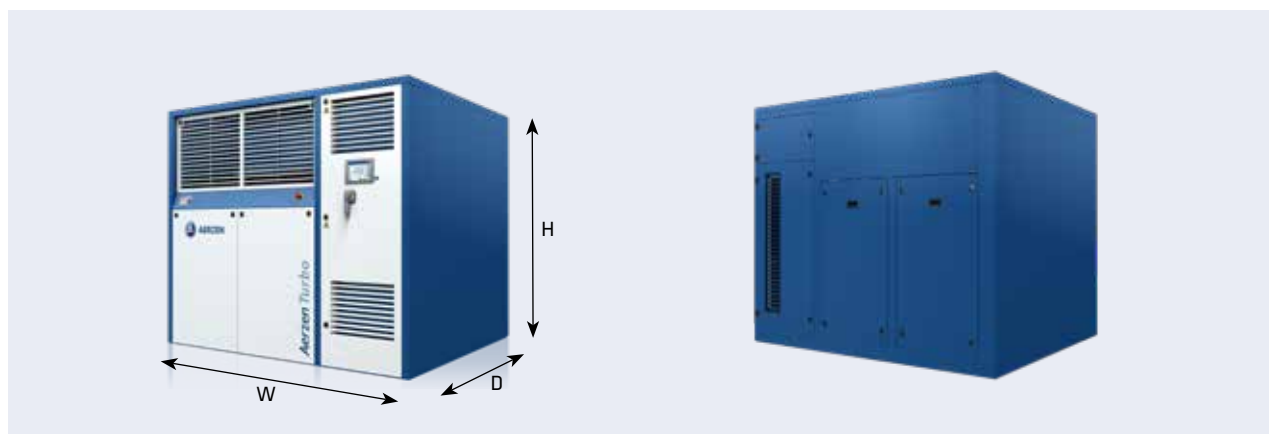
Aerzen Turbo Generation 5<sup>plus</sup> - performance data, dimensions, and weights



Blower size	Performance data					Dimensions and weights				
	Pressure max. mbar	Volume flow in m <sup>3</sup> /h min/max		Motor performance max. kW	Sound pressure level dB(A)	Length (W) mm	Width (D) mm	Height (H) mm	DN	Weight with hood kg
AT 25-0.8 G5 <sup>plus</sup>	800	360	900	20	72-75	800	1,040	1,500	100	550
AT 50-0.6 G5 <sup>plus</sup>	600	600	2,700	40	72-75	800	1,040	1,500	150	550
AT 50-0.8 G5 <sup>plus</sup>	800	600	1,900	40	72-75	800	1,040	1,500	150	550
AT 75-0.6 G5 <sup>plus</sup> *	600	900	3,900	60	73-76	1,000	1,300	1,900	200	680
AT 75-0.8 G5 <sup>plus</sup> *	800	900	2,900	60	73-76	1,000	1,300	1,900	200	680
AT 100-0.6 G5 <sup>plus</sup> *	600	1,200	5,100	80	73-76	1,000	1,300	1,900	250	680
AT 100-0.8 G5 <sup>plus</sup> *	800	1,200	3,900	80	73-76	1,000	1,300	1,900	200	680
AT 100-1.0 G5 <sup>plus</sup> *	1,000	1,400	3,000	80	73-76	1,000	1,300	1,900	200	680
AT 150-0.6 G5 <sup>plus</sup>	600	2,700	7,800	120	73-77	1,000	1,300	1,900	250	870
AT 150-0.8 G5 <sup>plus</sup>	800	1,800	5,400	120	73-77	1,000	1,300	1,900	250	870
AT 150-1.0 G5 <sup>plus</sup>	1,000	1,500	4,800	120	73-77	1,000	1,300	1,900	250	870
AT 200-0.8 G5 <sup>plus</sup>	800	2,700	8,400	150	73-77	1,000	1,300	1,900	250	870
AT 200-1.0 G5 <sup>plus</sup>	1,000	1,800	6,000	150	73-77	1,000	1,300	1,900	250	870

(Data and dimensions non-binding. Subject to technical modifications) \* In preparation

## Aerzen Turbo Generation 5 - performance data, dimensions, and weights



Blower size	Performance data					Dimensions and weights				
	Pressure max. mbar	Volume flow in m³/h min/max		Motor performance max. kW	Sound pressure level dB (A)	Length (W) mm	Width (D) mm	Height (H) mm	DN	Weight with hood kg
AT 300-0.6 G5	600	5,400	15,000	245	75-78	2450	2170	2105	500	2750
AT 300-0.8 G5	800	3,600	11,400	245	75-78	2450	2170	2105	400	2650
AT 300-1.0 G5	1,000	3,000	9,600	245	75-78	2450	2170	2105	400	2650
AT 400-0.8 G5	800	5,400	16,200	325	75-78	2450	2170	2105	500	2815
AT 400-1.0 G5	1,000	3,600	11,200	325	75-78	2450	2170	2105	500	2815

(Data and dimensions non-binding. Subject to technical modifications)

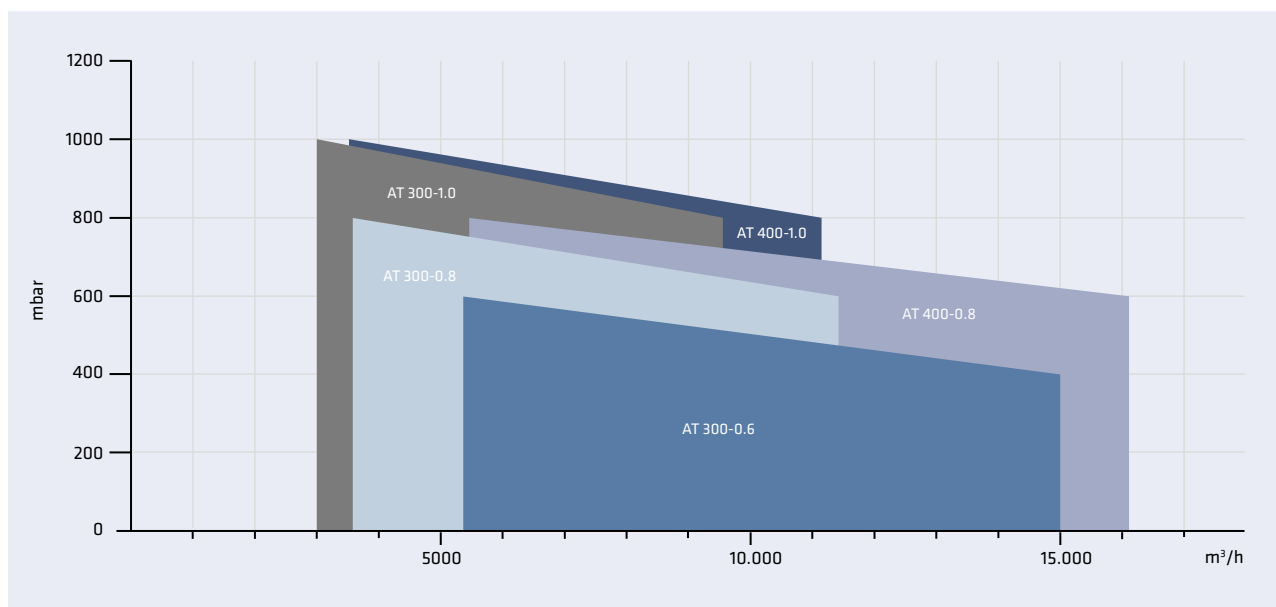
Right-sized is the magic word for efficient plant operation. The AERZEN Turbo assembly is available in different sizes, and for good reason. But that's precisely the starting point for our perfectly designed Turbo technology. Just ask the experienced experts at AERZEN.

# STRENGTH ON DISPLAY

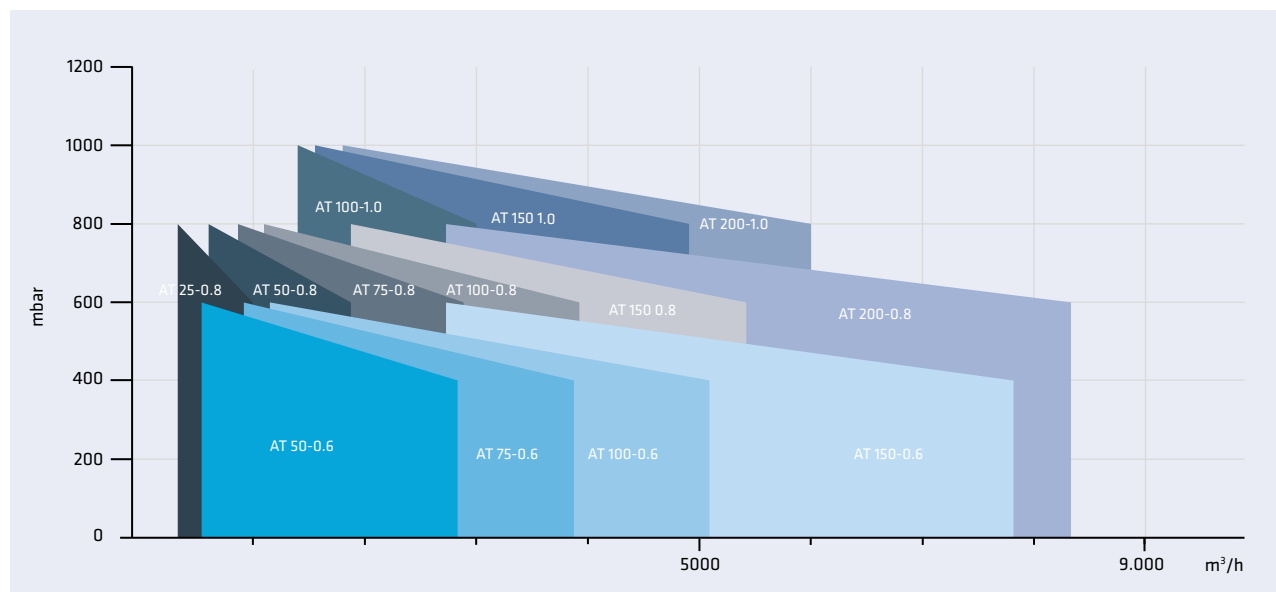
## A VARIETY OF TYPES FOR OPTIMAL PLANT CONFIGURATION.

Which Turbo assembly carries which load? You can find the answer in the breakdown of types, presented here for the Aerzen Turbo. Depending on the pressure requirements and the volume flow, you can choose between 18 different assembly variants,

Pressure and volume flow ranges for Generation 5



Pressure and volume flow ranges for Generation 5<sup>plus</sup>



An aerial photograph of three large, circular industrial tanks, likely for wastewater treatment. Each tank contains a large, red, lattice-structured agitator system. The tanks are arranged in a row, and the surrounding area appears to be a paved industrial site. The image is slightly blurred, giving it a sense of motion or a wide-angle shot.

AERZEN TURBO. INNOVATIVE TECHNOLOGY FOR  
DIVERSE APPLICATIONS.

# IN GOOD HANDS TECHNOLOGY FROM AERZEN.

As a plant operator, we can support you in many more ways than simply supplying top technological solutions. We also offer comprehensive support through our application know-how, experience and expertise. Around the world, 24 hours a day, 7 days a week.



*There for you when you need us – the world over. AERZEN.*

952.783 hrs.

2.489.23

4.762.239

1.236.854 hrs.

3.256.489 hrs



**Service when you need it, no matter where you are**

You need service – even when you don't need it. Our service teams will take care of your plant over its entire life cycle, helping to protect the value of your investment. We have created a close network that spans the globe: 50 subsidiaries and representatives in more than 100 countries, so that we are never far from where you are. Should you ever need it, you can depend on one of our 100 service mechanics to be there for you quickly.

**Security = AERZEN**

- commissioning by qualified experts
- individualised training for your in-house staff
- client-specific service and maintenance contracts
- remote maintenance system for your assembly
- on-site service also available

**Well prepared: our application expertise**

Our familiarity with a wide range of compressor technology applications builds on 150 years of history and more than 25,000 configured waste water plants on every continent. A veritable treasure trove of experience. It provides the basis for our unique expertise and innovation and makes us valuable advisers for all your application questions. Take advantage of our know-how in the technical and economic preparation of your treatment plant for the coming decades.

37 hrs.  
hrs.  
S.



**AERZEN. Compression - the key to our success.**

AERZEN was founded in 1864 as Aerzener Maschinenfabrik. In 1868, we built Europe's first positive displacement blower. The first Turbo blowers followed in 1911, the first screw compressors in 1943, and in 2010 the world's first rotary lobe compressor package. Innovations "made by AERZEN" keep driving forward the development of compressor technology. Today, AERZEN is among the world's longest established and most significant manufacturers of positive displacement blowers, rotary lobe compressors, screw compressors, and Turbo blowers. AERZEN is among the undisputed market leaders in many areas of application.

At our 50 subsidiaries around the world, over 2,000 experienced employees are working hard to shape the future of compression technology. Their technological expertise, our international network of experts, and the constant feedback we get from our customers provide the basis for our success. AERZEN products and services set the standard in terms of reliability, stability of value and efficiency. Go ahead - challenge us!

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**AERZEN**  
EXPECT PERFORMANCE