# PLANNING FOLDER WASTEWATER

Positive displacement blower, rotary lobe compressor and turbo blower. Performance³. For plant manufactures, engineering offices and operators.

AERZEN

# **TECHNOLOGIES BY AERZEN.**
# MORE THAN 150 YEARS OF EXPERIENCE.


Expect Performance.
The story of AERZEN? It is the story of compressor technology. In 1868, we built the first positive displacement blower in Europe. In 1911, we were the first to build turbo blowers in the world. Then, in 1943, the first for screw type compressors, and in 2010, the first rotary lobe compressor worldwide. And today? Today, it is our task to design these machines to work as efficiently as possible - and to adapt them to the hundreds of applications our customers bring to us.
What remains? We have preserved the character of a medium-sized family company into the fourth generation. This gives us the drive to be innovative. And to develop products which support our customers significantly in their global markets. Expect a lot. Expect Performance!

Typical for AERZEN.
What distinguishes modern premium technologies? Performance and worldwide service? Of course. Energy efficiency? Nowadays, this goes without saying. However, we, at AERZEN, believe there is more to it than that. More ideas, for example. These are evident in many national and international patents.
But at AERZEN, these can also be found in more discreet aspects of our machines. In the particularly compact design. In our simple Plug&Play principle. In their fantastic comfortable operating concepts. Or think about the unusually long oil change and maintenance intervals. This brings us back to the topic of quality. The unconditional reliability, the extremely long service life of our technology paired with ground-breaking energy efficiency - all of this is typical for AERZEN.

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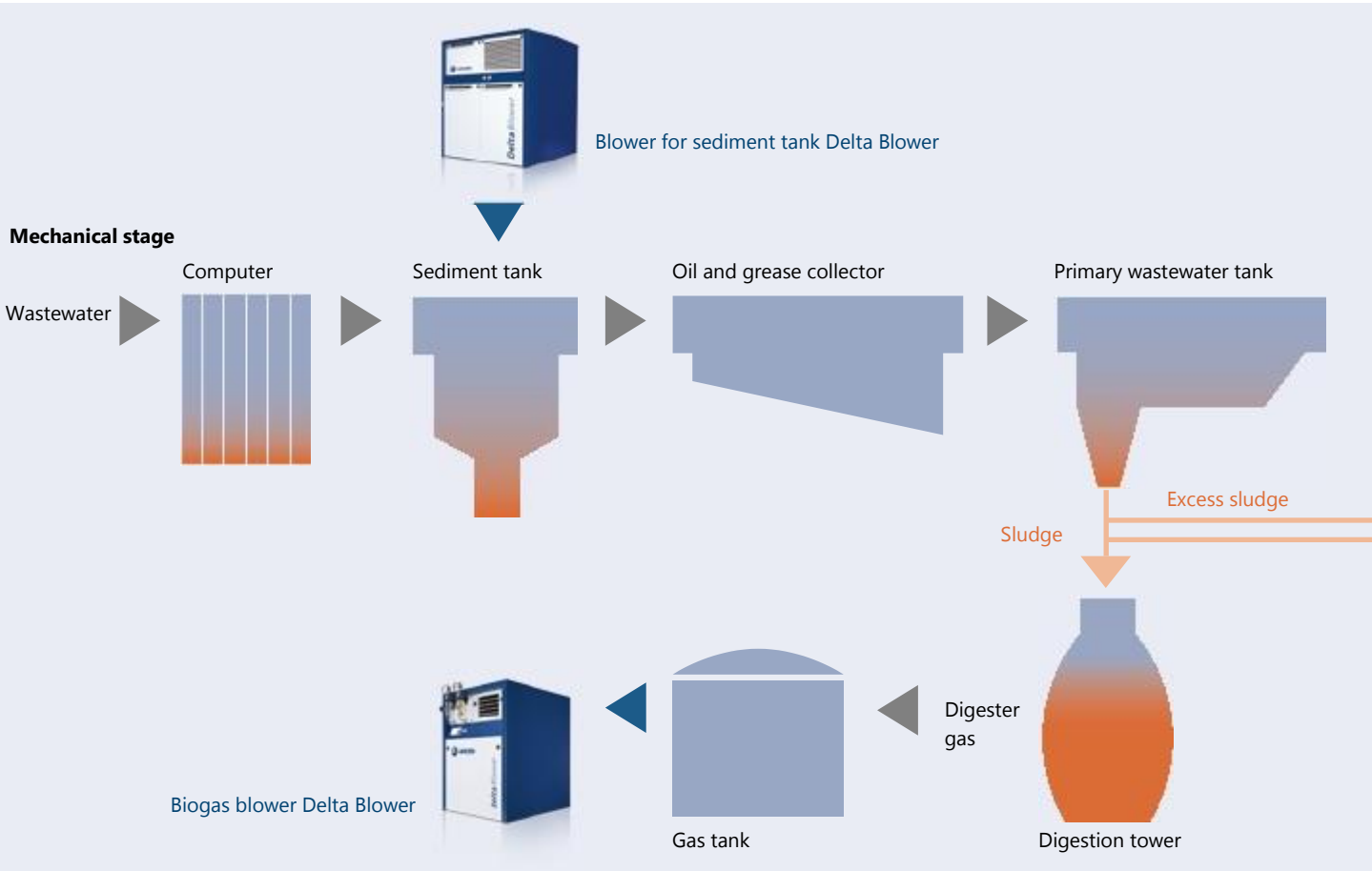
Planmap ABWA – EN – 00 – 12.2015

# AERZEN AND WASTEWATER TECHNOLOGY.

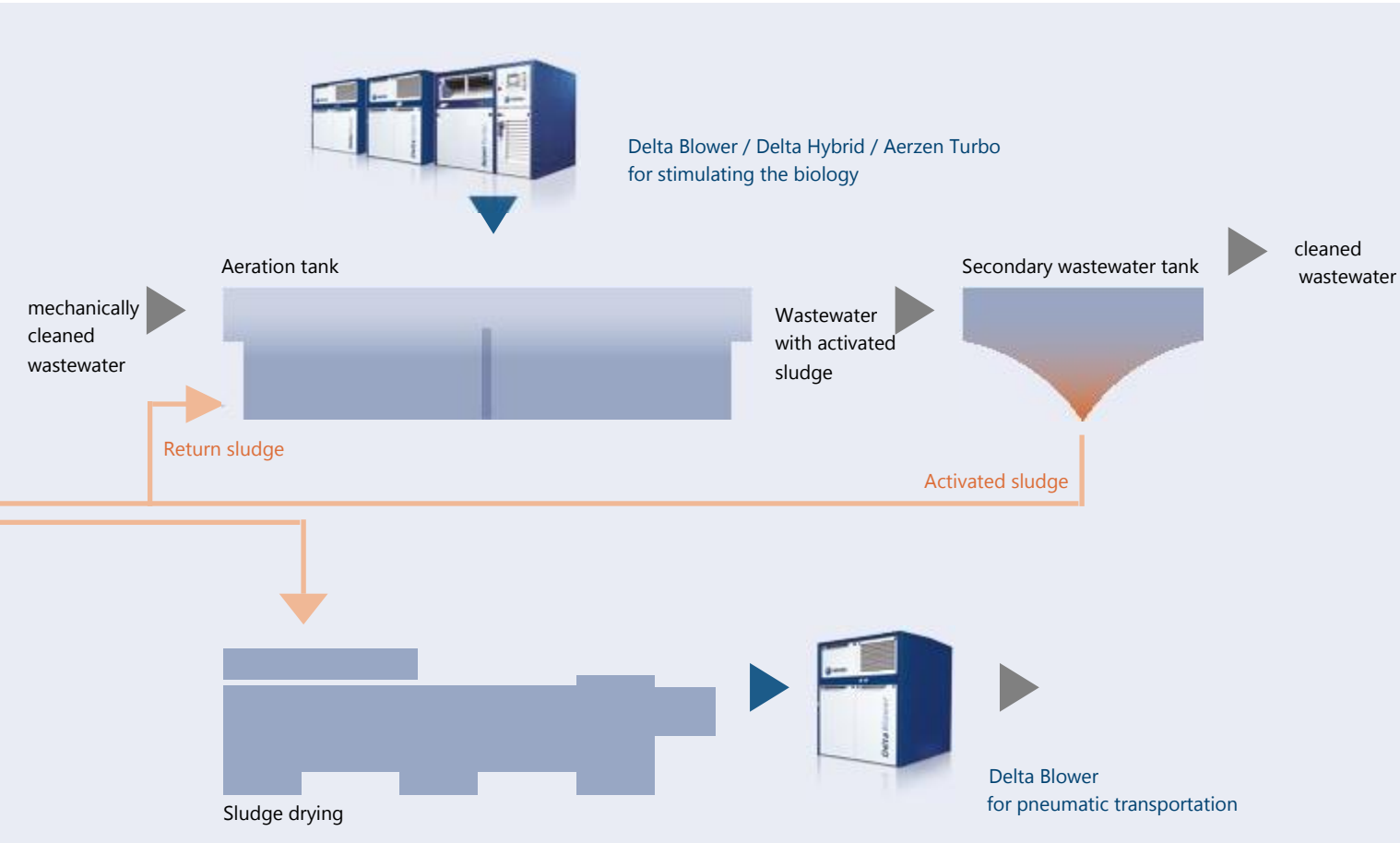
**Industrialisation is spreading ever further. Even Third World countries are no longer exempt from this. In the established industrial nations of this world, the extent of mechanisation has reached a point at which nature alone is no longer able to compensate the strains associated with technology. Key topics such as global warming and lowering of the groundwater table dominate newspaper headlines and are subject of discussions amongst people. The call to sustain our environment is becoming louder and louder.**

The procedure
There are many options to apply methods to avoid damaging the environment. In the case of wastewater e.g. the ventilation of the sediment tank or the pressure ventilation of biological wastewater treatment systems. The oxygen introduction is important, for deep wastewater tanks, wastewater treatment systems with standard aeration tanks or natural clarification ponds alike.

If the wastewater has already entered the natural cycle, ventilating lakes and rivers prevents additional contamination. When treating drinking water, rinsing the filters with compressed air ensures that perfect water is provided and natural water reserves are not used excessively. Gas which occurs on landfill sites, digestion towers or gas which is produced when treating wastewater does not escape into the environment anymore or is not just burned.



It is used sustainably to create energy to relieve the environment and remedy resource deficits. Due to the pressure increase of biogas blowers, the gas is transported to CHPs or generators where the converted energy can be used to heat buildings or greenhouses, for example. The produced gas is measured by AERZEN rotary piston gas meters. During sludge drying processes, AERZEN positive displacement blowers can be used for the subsequent pneumatic transport of the dried sludge. AERZEN products not only do their job in the examples given above. Just as there are many options to protect the environment, there are many areas of application for AERZEN positive displacement blowers, rotary lobe compressors and turbo blowers.



# APPLICATION REPORTS.

## WASTEWATER TREATMENT PLANT ARNSBERG WILDSHAUSEN

**New AERZEN turbo blower improves performance and efficiency.**

Background: cost-intensive old plant
The Ruhrverband Essen operates a biological wastewater treatment plant designed for 98,000 p.e. in Arnsberg - Wildshausen. It cleans the wastewater of 48,000 people and also the wastewater of a paper mill. This mill supplies between 3,000 and 6,000 $m_3$ wastewater every day which is pre-treated anaerobically in two IC-reactors (IC = Internal circulation). The entire flow in the wastewater treatment plant fluctuates between 210 and 1,070 l /s depending on the day of the week, time of day and the weather. The plant operates with an activated sludge procedure. The wastewater first flows past two counterflow screens. Then, sand and other minerals are collected in two parallel sand collector chambers. Finally, it is aerated in three consecutive aeration tanks. The air required for this is generated in the central air station in the basement of the press building. Three nineteen-year-old turbo compressors were in operation there until November 2012. They were connected in series and were operated according to the load-dependent air requirements of the three aeration tanks. The paper mill pre-treated its wastewater and therefore, only a maximum of two turbo blowers were required to generate the air necessary for the aeration process. This anaerobic pre-treatment transforms the carbon contained in the wastewater mainly into methane. The exhaust air contaminated with hydrogen sulphide is sucked off by an AERZEN positive displacement blower of the Delta Blower series which is attached to the aeration tank. It is then pushed into the aeration tank. This means that the carbon filter previously used for cleaning the exhaust air is no longer required. Costs associated with this are saved. Furthermore, the odour around the aeration tank improved significantly.

Problem: Wear and high cost
One of the three old turbo systems already showed significant wear in 2012. Rather than going through extensive and expensive revisional work, this old plant was going to be replaced by a new turbo compressor.

| | |
|---|---|
| Segment | Environmental technology |
| Problem | High maintenance and energy costs |
| Solution | Aerzen Turbo Generation 5 |
| Result | Significant energy saving, reduction of maintenance and ancillary costs, improvement of supply reliability. |
| Company | Aerzener Maschinenfabrik GmbH<br>Reherweg 28 - 31855 Aerzen<br>Germany<br>Phone: +49 5154 81-0<br>Fax: +49 5154 81-9191<br>info@aerzener.de<br>www.aerzener.de |
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This was done to also improve the energy efficiency of the station and to increase the supply reliability in the aeration tanks.

*„Our turbo blower from the Aerzen Turbo Generation 5 series saves up to 6 % energy, reduces maintenance and ancillary costs, improves supply reliability and means that the expensive general overhaul of the old system is no longer necessary."*

Markus Droppelmann,
Group manager Ruhrverband Essen

The solution: AERZEN Turbo Generation 5
Markus Droppelmann, group manager Obere Ruhr for the Ruhrverband in Essen, saw the new turbo blower "Aerzen Turbo Generation 5" for the first time when he visited the IFAT in Munich in May 2012. The performance data of one system of this new design was almost identical to those of the system which needed replacing. Droppelmann reports: "A detailed profitability calculation revealed that this exchange would actually save 5 to 6 % energy. That means that the exchange would redeem itself after five to eight years just considering the ongoing energy costs." Furthermore, the design-related problem of oil storage for lubrication and cooling purposes does not occur with the new system. "This means we did not only avoid the cost for the due general maintenance of a nineteen-year-old machine with a new system. We could also lower our energy costs, save $CO_2$ within the group and increase the supply reliability of our wastewater treatment plant, " the group manager explains the decision.

The change: New turbo blower as base load system
Peter Knippers prefers to use the new system as the base load system. A second system from the old plant is added as a peak load system for only five hours a day. "As soon as the prescribed oxygen target value in the tank drops the new turbo blower kicks in, which then increases the output by increasing the speed, " he explains. If the system has reached its upper performance limit, the old system is switched on. The performance of the turbo blower is then lowered so that both systems can operate in parallel. If the target value in the tank is reached again, the old system switches off and the Generation 5 takes over by itself.

The result: Powerful and efficient
AERZEN is an experienced application specialist and offers positive displacement blowers and turbo blowers from one place. The new turbo blower design AT Turbo Generation 5 was designed for high intake volume flows and sets a new example in wastewater treatment. The speed-regulated state-of-the-art turbo machines which work oil-free offer significant advantages for wastewater treatment, particularly regarding performance strength and efficiency.

Advantages AERZEN Turbo Generation 5:
· Maximised performance and energy efficient for high volume flows
· Low service life costs
· High-tech components with long service life
· Low maintenance and service effort
· Low sound level

The company
The Aerzener Maschinenfabrik GmbH was founded in 1864 and is a world-leading supplier of twin-shaft positive displacement machines and turbo machines. The product range includes rotary lobe compressors, positive displacement blowers, turbo blowers, screw compressors and gas meters. The Aerzener Maschinenfabrik employs around 1,800 employees and has more than 40 international subsidiaries. Aerzen's innovative technology solutions benefit from the experience gained from more than 150 years in business. Worldwide, industrial plants are supplied with gaseous media using AERZEN blowers, compressors, turbos and gas meters. Apart from standard products, the company also offers customised solutions. Furthermore, Aerzen offers a comprehensive range of After-Sales services - from repairs to upgrades of existing systems and to condition monitoring.

# AERZEN SERVICE

## Correct service to secure and increase energy efficiency of biological wastewater treatment plants.

Background: Energy and cost efficiency for biological wastewater treatment plants
Every biological wastewater treatment plant requires a compressed air station to supply the oxygen for the aeration tank. This only operates with maximum energy efficiency, if it is not possible that the downstream system increases the system pressure, insufficient ventilation does not cause excessive suction temperatures and/or insufficient maintenance does not lead to increased operating time. Practical examples show that these criteria influence the energy efficiency of a blower negatively and lead to a significant increase in energy costs.

*„Practical examples show that a pressure increase of, for example, 50 mbar can lead to an increased energy consumption of five to ten percent depending on the design of the blower. This can lead to several thousands of Euros in extra costs. (...)"*
Frank Glöckner, After-Sales-Service

Example: Increased system pressure caused by the downstream system
Every blower is set to a pre-defined pressure before leaving the factory. The air compressed to this pressure is then led to vents distributed throughout the tank via ring line with several stub lines. Diaphragm control valves which are correctly operated at the inlet of the tank are a precondition for the optimal operation. Incorrectly set valves quickly lead to increased pressure in the supply network, the blowers must operate against increased pressure and the energy costs increase. Furthermore, the diaphragm control valves are controlled via pressure stabilization. This means, the supply lines are automatically closed when the required oxygen level is reached. The blowers which are often frequency-regulated are shut down in a time-lagged manner after the valve is closed. If this delay (waiting period) is set too long, the blowers have to operate against closed or partially closed valves in full load. This has the effect that air escapes via the pressure valves. This does not only lead to air loss. In extreme cases, an increased counter pressure can also damage the blower packaged units. The counter pressure can also increase when the diffusers in the tank have aged due to chemical compounds

| | |
|---|---|
| Segment | Service |
| Problem | Increased pressure, high room temperatures and insufficient maintenance lead to high cost |
| Solution | Correct and comprehensive service |
| Result | Increase of energy efficiency and reduction of cost |
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in the wastewater. This is also possible when pipelines and/or diffusers have become blocked over time because pressure silencers of the pressure creators are cladded with adsorption material which has come loose over time and then entered the system via the network. This danger does not occur with AERZEN positive displacement blowers which were built after 1995 and with AERZEN rotary lobe compressors of the new Delta Hybrid range. The foundation of these systems is a pulsation silencer and a reduction in noise is achieved by diverting air and not by using adsorption material.

Example: Excessive intake temperature
The air used for compression and cooling a blower is often taken directly from the installation location and not supplied via air inlet channels for biological wastewater treatment plants. This means that the room temperature has a significant impact on the energy balance of the system. The room temperature increases when the ventilation openings are positioned incorrectly and/or are too small, if the air supply is not supported by fans which are controlled via thermostats or if their performance is not sufficient, if the roof of the compressor room is not sufficiently insulated against intensive sun radiation or if the compressed air supply lines within the station are not or not sufficiently insulated. The increase of room temperature also leads to an increased compressed air temperature and thus, leads to reduced oxygen levels of the compressed air, a worse filling level and to inferior cooling of the blowers. All of these criteria have one consequence: The compressed air generator has to work longer to produce the required amount of oxygen. As a rule of thumb, you can say that a temperature reduction of 3°C saves 1% of energy. This is a reason why AERZEN blowers always suck in air on the "cold" side of the packaged unit and not on the discharge side with the pipe connection, as on this side there is a higher amount of radiated heat.

Example: Insufficient maintenance
If the system is not maintained as instructed by the manufacturer, this can also have a negative effect on the energy balance. Classic examples are pressure valves damaged by resistances which are too high or an air filter which was exchanged too late. If this air filter is not exchanged for example, to save 50 Euros, and only removed and blown out, the energy requirements of the blower increase. As a general guideline: A reduction of pressure on the suction side by 10 mbar reduces the energy costs by approx. 1%. For example, a new filter reduces the pressure by approx. 5 mbar, dirty filters, however, drop the pressure by 30 mbar.

Conclusion
Increasing energy costs can be avoided if all blowers are maintained and serviced by the service departments of the manufacturer and/or the operator. After all, the energy costs of a compressor - when considering its long service life - make up almost 90% of the system's entire cost. Only approx. 10% are spent on investment and maintenance costs.

The company
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# PLANNING FOUNDATIONS.

**Technical and design features and the changing air requirements in aeration tanks challenge the ventilation technology of every wastewater treatment plant. The demand for energy efficiency and the reduction of operating costs are particularly important. However, the most important criterion when planning wastewater treatment plants is still the highest level of reliability and availability. The iron principle of engineering "each chain is only as strong as its weakest link" still applies. That is why we would like to give some basic information about the machine design, room design and pipework routing.**

Calculation of operating data
Standard state (physical)
The standard state of a gas
refers to the pressure $p_{Nabs}$ = 1,01325 bar
at the temperature $T_N$ = 273 K - ^0°C
e.g. volume flow in standard state $Q_N$ [$m_{N3}$/h]
density in standard state $\rho_N$ [kg/$m_3$]
relation between Celsius temperature t[°C]
$T=T_N+t$ [K] and the thermodynamic temperature T[K]

Suction state
The blowers/compressors are constructed in the suction state, i.e. at the actual pressure in the inlet socket $p_{1abs}$[bar] at the average or maximum temperature of the gas in the inlet socket $t_1$[°C] or $T_1=T_N+T_1$[K]. For the suction of atmospheric air aim for the average abs. suction pressure $p_{1abs}$ = 1.0 bar suction temperature $t_1$ = 20°C or $T_1$ = 293K

Impact of installation height
The atmospheric pressure $p_{1abs}$ decreases as the height of the installation location increases:

| mNN | $P_{1abs}$[bar] | mNN | $P_{1abs}$[bar] | mNN | $P_{1abs}$[bar] | mNN | $P_{1abs}$[bar] |
|---|---|---|---|---|---|---|---|
| 0 | 1,031 | | | | | | |
| 100 | 1,001 | 1100 | 0,888 | 2100 | 0,785 | 3100 | 0,692 |
| 200 | 0.989 | 1200 | 0,877 | 2200 | 0,776 | 3200 | 0,684 |
| 300 | 0,977 | 1300 | 0,867 | 2300 | 0,765 | 3300 | 0,675 |
| 400 | 0,967 | 1400 | 0,856 | 2400 | 0,756 | 3400 | 0,667 |
| 500 | 0,955 | 1500 | 0,845 | 2500 | 0,747 | 3500 | 0,657 |
| 600 | 0,944 | 1600 | 0,835 | 2600 | 0,737 | 3600 | 0,649 |
| 700 | 0,932 | 1700 | 0,824 | 2700 | 0,728 | 3700 | 0,641 |
| 800 | 0,921 | 1800 | 0,815 | 2800 | 0,719 | 3800 | 0,632 |
| 900 | 0,909 | 1900 | 0,805 | 2900 | 0,709 | 3900 | 0,624 |
| 1000 | 0,899 | 2000 | 0,795 | 3000 | 0,701 | 4000 | 0,616 |

Calculation of volume flow Q from prescribed mass flow $\dot{m}$

1. For the standard state: $Q_N=\frac{\dot{m}}{\rho_N}$ [$m_N^3$/h]
   with mass flow $\dot{m}$ in [kg/h] Density ρ in [kg/$m_3$]
2. For the suction state:

Density $\rho_n$ of gases in standard state and specific heat capacity $c_p$

| | Air | Natural gas | Town gas | Landfill gas | Nitrogen | Hydrogen |
|---|---|---|---|---|---|---|
| $\rho_n$ [kg/m³] | 1,293 | 0,96 | 0,61 | 1,21 | 1,25 | 0,09 |
| $C_p$ [kJ/kgK] | 1,005 | 1,926 | 2,227 | 1,314 | 1,038 | 14,051 |

Calculation of intake volume flow $Q_1$ from prescribed standard volume flow $Q_N$

1. Dry gas $$Q_1 = \frac{P_{Nabs} \cdot T_1}{p_{1abs} \cdot T_N} * Q_N \left[\frac{m^3}{h}\right]$$

2. Humid gas $$Q_1 = \frac{P_N}{T_N} * \frac{T_1}{P_{1abs} - \varphi * p_s} * Q_N \left[\frac{m^3}{h}\right]$$

The conversion according to equation (1) for transport and compression of atmospheric air (relative humidity on average 60% and installation height up to 500 mNN) is sufficiently exact!

$P_{Nabs}$ abs. = Pressure in standard state in [bar]
$p_{1abs}$ abs. = Pressure in suction state in [bar]
$T_1$ = Temperature in suction state in [K]
$T_N$ = Temperature in Normzustand: $T_N$ = 273 K
$Q_N$ = Standard volume flow in [$m_{N3}$/h] in dry state
= Humidity, cp = RF 1 00 [ II ]]
RF = relative humidity in [%]
$P_S$ = Partial pressure of steam in [bar], see Table Partial pressure of steam, saturation state
$\rho_N$ = Density in standard state in [kg/m³ ]]
$\rho_s$ = Density of steam in [kg/m³]

Calculation of density „“₁ in suction state

1. Dry gas $$\rho_1 = \rho_N * \frac{T_N * p_{1abs}}{p_{Nabs} * T_1} \left[\frac{kg}{m^3}\right]$$

2. Humid gas $$\rho_N * \frac{T_N}{P_{Nabs}} * \frac{p_{1bar} - \varphi * P_S}{T_1} + \varphi * \rho_i \left[\frac{kg}{m^3}\right]$$

Density „“₁ in suction state of atmospheric air $p_{1abs}$ = 1,0 bar

| Intake temperature [°C] | -20 | -10 | 0 | 5 | 10 | 15 | 20 | 30 | 40 |
|---|---|---|---|---|---|---|---|---|---|
| Density [kg/m³] | 1,377 | 1,325 | 1,276 | 1,253 | 1,231 | 1,210 | 1,19 | 1,15 | 1,113 |

Partial pressure of steam, saturation state

| t [°C] | $P_s$ [bar] | $\rho_s$ [kg/m³] | t [°C] | $P_s$ [bar] | $\rho_s$ [kg/m³] | t [°C] | $P_s$ [bar] | $\rho_s$ [kg/m³] |
|---|---|---|---|---|---|---|---|---|
| -20 | 0,001029 | 0,000881 | 13 | 0,014965 | 0,01134 | 42 | 0,08198 | 0,05652 |
| -18 | 0,001247 | 0,001059 | 14 | 0,015973 | 0,01206 | 44 | 0,09100 | 0,06236 |
| -16 | 0,001504 | 0,001267 | 15 | 0,017039 | 0,01282 | 46 | 0,10086 | 0,06869 |
| -14 | 0,001809 | 0,001513 | 16 | 0,018168 | 0,01363 | 48 | 0,11162 | 0,07557 |
| -12 | 0,002169 | 0,001800 | 17 | 0,019362 | 0,01447 | 50 | 0,12335 | 0,08302 |
| -10 | 0,002594 | 0,002136 | 18 | 0,02062 | 0,01536 | 52 | 0,13613 | 0,09108 |
| -8 | 0,003094 | 0,002529 | 19 | 0,02196 | 0,01630 | 54 | 0,15002 | 0,09979 |
| -6 | 0,003681 | 0,002986 | 20 | 0,02337 | 0,01729 | 56 | 0,16511 | 0,1092 |
| -4 | 0,004368 | 0,003517 | 21 | 0,02485 | 0,01833 | 58 | 0,18147 | 0,1193 |
| -2 | 0,005172 | 0,004133 | 22 | 0,02642 | 0,01942 | 60 | 0,1992 | 0,1302 |
| 0 | 0,006108 | 0,004847 | 23 | 0,02808 | 0,02057 | 62 | 0,2184 | 0,1420 |
| 1 | 0,006566 | 0,005192 | 24 | 0,02982 | 0,02177 | 64 | 0,2391 | 0,1546 |
| 2 | 0,007055 | 0,005588 | 25 | 0,03166 | 0,02304 | 66 | 0,2615 | 0,1681 |
| 3 | 0,007575 | 0,005946 | 26 | 0,03360 | 0,02437 | 68 | 0,2856 | 0,1826 |
| 4 | 0,008129 | 0,006358 | 27 | 0,03564 | 0,02576 | 70 | 0,3116 | 0,1982 |
| 5 | 0,008781 | 0,006795 | 28 | 0,03778 | 0,02723 | 72 | 0,3396 | 0,2148 |
| 6 | 0,009345 | 0,007258 | 29 | 0,04004 | 0,02876 | 74 | 0,3696 | 0,2326 |
| 7 | 0,010012 | 0,007748 | 30 | 0,04241 | 0,03037 | 76 | 0,4019 | 0,2515 |
| 8 | 0,010720 | 0,008267 | 32 | 0,04753 | 0,03382 | 78 | 0,4365 | 0,2718 |
| 9 | 0,011472 | 0,008816 | 34 | 0,05318 | 0,03759 | 80 | 0,4736 | 0,2933 |
| 10 | 0,012270 | 0,009396 | 36 | 0,05940 | 0,04172 | 90 | 0,7011 | 0,4235 |
| 11 | 0,013116 | 0,01001 | 38 | 0,06624 | 0,04624 | 100 | 1,0133 | 0,5977 |
| 12 | 0,014014 | 0,01066 | 40 | 0,07375 | 0,05116 | | | |

# PRESSURE AND TEMPERATURE FLUCTUATIONS - PERFORMANCE BEHAVIOUR OF POSITIVE DISPLACEMENT BLOWERS

Pressure fluctuations

Positive displacement blowers should be designed for the maximum occurring pressure difference (example in waste-water technology: pressure difference $\Delta P_{max}$ = max. blow-in depth + max. pressure loss of fans + pressure loss of pipelines/ fittings).

The coupling performance at max. pressure difference specifies the selection of the drive motor. Positive displacement blowers only take on the power which is generated by the actual counter pressure.

Temperature fluctuations

Due to the changes in density of the sucked in air, the intake volume flow fluctuates when the temperatures change. The max. occurring intake temperature must be the basis to determine the blower design to bring in the desired air mass or of a standard volume flow. The volume flow adapts to different intake temperatures via the speed regulation of the positive displacement blower.

Example for the performance behaviour of a regulated positive displacement blower for pressure and temperature fluctuations

| Pressure difference [mbar] | Regulation point [%] | Intake volume flow $Q_1$[$m_3$/h] and coupling performance PK[kW] at intake temperature $T_1$[k] | | | | | |
|---|---|---|---|---|---|---|---|
| | | 308k | | 293k | | 273k | |
| | | $Q_1$ | $P_K$ | $Q_1$ | $P_K$ | $Q_1$ | $P_K$ |
| 600 | 100<br>50<br>25 | 971<br>486<br>242 | 21,6<br>11,7<br>7,2 | 924<br>462<br>230 | 20,5<br>11,1<br>6,9 | 861<br>431<br>215 | 19,0<br>10,4<br>6,5 |
| 525 | 100<br>50<br>25 | 971<br>486<br>242 | 19,0<br>10,1<br>6,2 | 924<br>462<br>230 | 18,0<br>9,6<br>5,9 | 861<br>431<br>215 | 16,7<br>9,0<br>5,6 |
| 450 | 100<br>50<br>25 | 971<br>486<br>242 | 16,5<br>8,6<br>5,1 | 924<br>462<br>230 | 15,5<br>8,2<br>4,9 | 861<br>431<br>215 | 14,4<br>7,6<br>4,7 |

| | |
|---|---|
| Necessary volume flow in standard state | $Q_N$= 850 $m_{N3}$/h |
| Max. pressure difference | Δp = 600 mbar |
| Min. pressure difference | Δp = 450 mbar |
| Desired regulation of volume flow | from 100 to 25 % |
| Selected: Compact blower GM 15 L, motor works at frequency converter. | |

# NOTES ABOUT MACHINE ROOM DESIGN AND PIPEWORK ROUTING

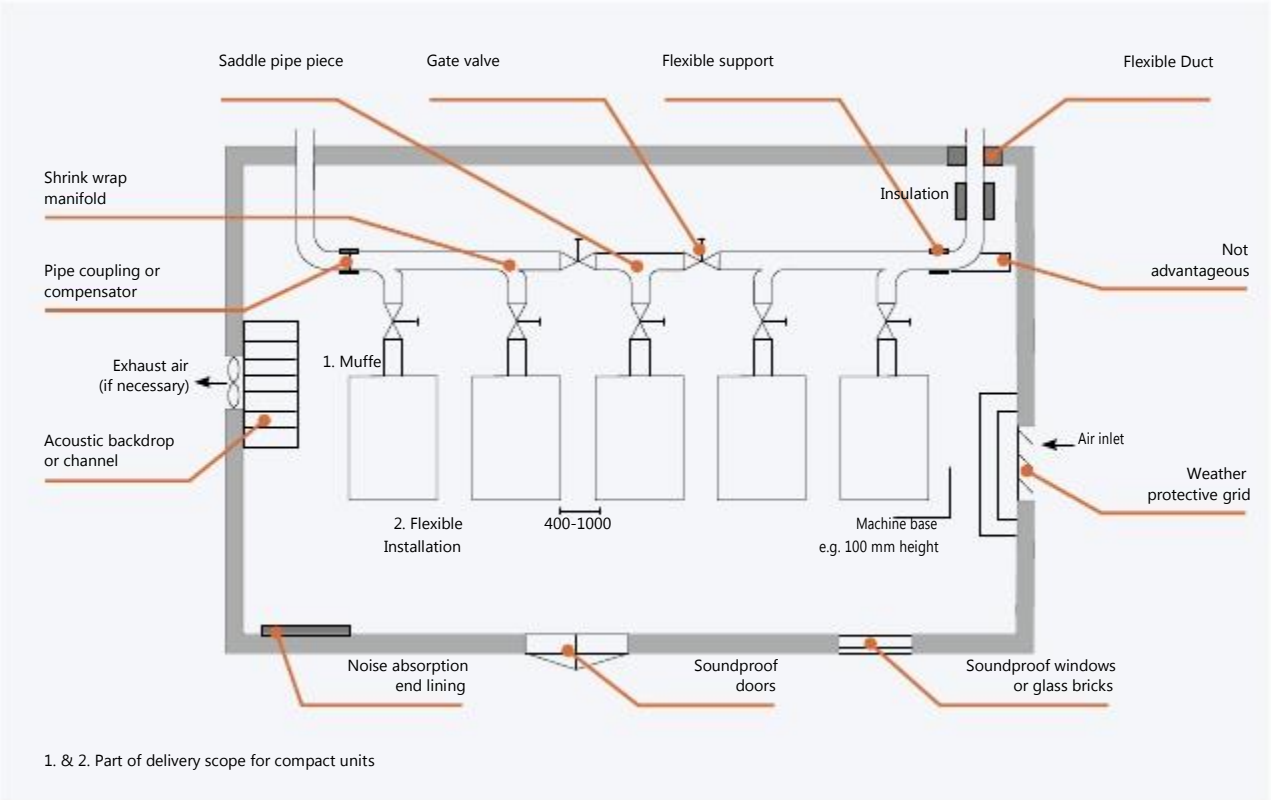
Machine room design

· Doors and mounting openings should be dimensioned sufficiently. Adequate ventilation of the room must be ensured.
· Lifting gear or a load track is advantageous for the assembly and disassembly of packaged units.
· Due to the flexible construction of compact blowers, no special foundations are necessary; the floor must be smooth and even and the static load of the packaged unit should be considered (dynamic loads are negligibly small).
· A noise-absorbing version/lining of the walls and the ceiling of the installation location is recommended (perforated bricks or sound-absorbing elements): the entire noise pressure level in the machine room is influenced significantly by its reverberation behaviour.

Pipelines

· Pressure pipelines are connected flexibly to the blower via a rubber sleeve or an axial compensator
· The pipeline should (when considering this from the flow direction) be fixed behind the connection element (fixed point)
· Recommended flow speed in pressure pipeline: in range of 8 - 30 m/s
· Compensators or pipe couplings should be installed between two fixed points
· (Expansion compensation for length changes due to heat)
· Pipe supports and mountings should be flexible and absorb structural noises
· Wall ducts should be flexible and absorb structural noises.
· Blind conduits should be avoided
· Pipe connections, e.g. from single to collector pipe, should be equipped with a pipe bend and installed so it is advantageous for the direction of the flow
· It is recommended to insulate pressure pipelines within the operation building

Example for the design of the machine room for (4+1) packaged units




1. & 2. Part of delivery scope for compact units

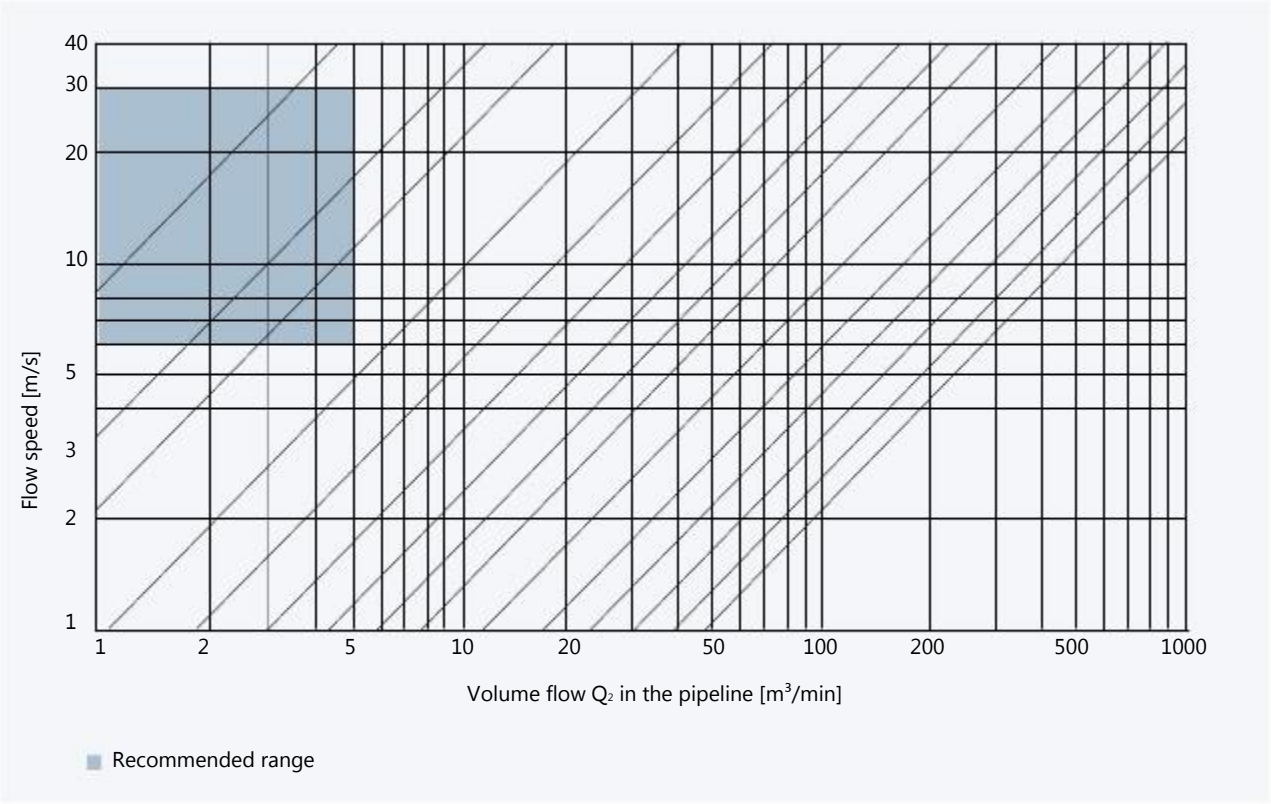
Dimensioning of pressure pipelines
Volume flow Q2 (pressed state) in pressure pipeline

$$Q_2 = Q_1 * \frac{p_{1abs}\,(273 + t_2)}{p_{2abs}\,(273 + t_1)} \left[\frac{m^3}{min}\right]$$

The discharge temperature $t_2$ depends on the intake temperature and the pressure difference „"p. Values for $t_2$ according to information in offer or in the leaflet. Guideline: 10°C increase of intake temperature per 0.1 bar pressure increase.

| | |
|---|---|
| $Q_1$ | Intake volume flow in [$m_3$/min] |
| $p_{1abs.}$ | Absolute intake pressure in [bar] |
| $p_{2abs.}$ | Absolute discharge pressure in [bar] |
| $p_{2abs.}$ | = $p_{1abs.}$ + Δp |
| $\Delta_p$ | Pressure difference in [bar] |
| $t_2$ | Discharge temperature |

Rough selection of pipeline nominal size




Volume speed $c_2$ in the pressure pipeline

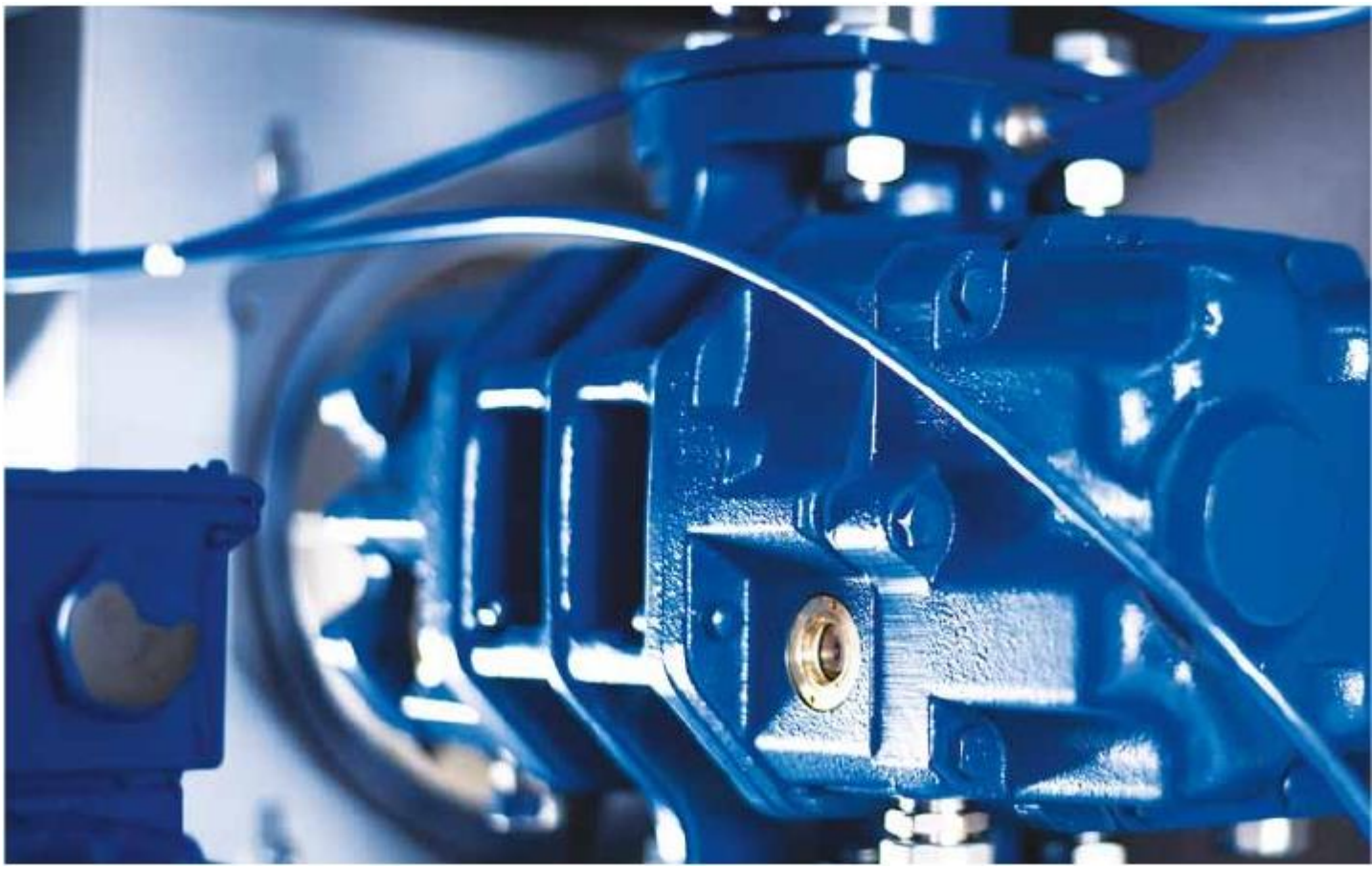
$$c_2 = \frac{Q_2}{A} = \frac{Q_2}{15 * [] * d^2} = \frac{Q_2}{47,1 * d^2} \left[\frac{m}{s}\right]$$

$Q_2$ Volume flow in pressure state in [$m_3$/min]
d Pipeline interior diameter in [m]

A flow speed of 30 m/s should not be exceeded in the pressure pipeline.

# **POSITIVE DISPLACEMENT BLOWER.**
# DELTA BLoWER.

The positive displacement blower according to the Roots principle has been built in Aerzen since 1868. Therefore, AERZEN produced the first European positive displacement blower. In 1987, AERZEN introduced the three-lobe blower to the market and also patented this procedure. Building from this long experience, the positive displacement blower has been developed into a highly technological product.



Function of the positive displacement blower.
The conveying direction depends on the turning direction of the rotors and the installation position of the stage. Based on the assumption that the typical installation positions is a vertical conveyance and that the turning direction creates conveying from top to the bottom, the basic principle can be explained as follows: As you can see in the illustration, the air flows from the upper suction inlet into the stage.

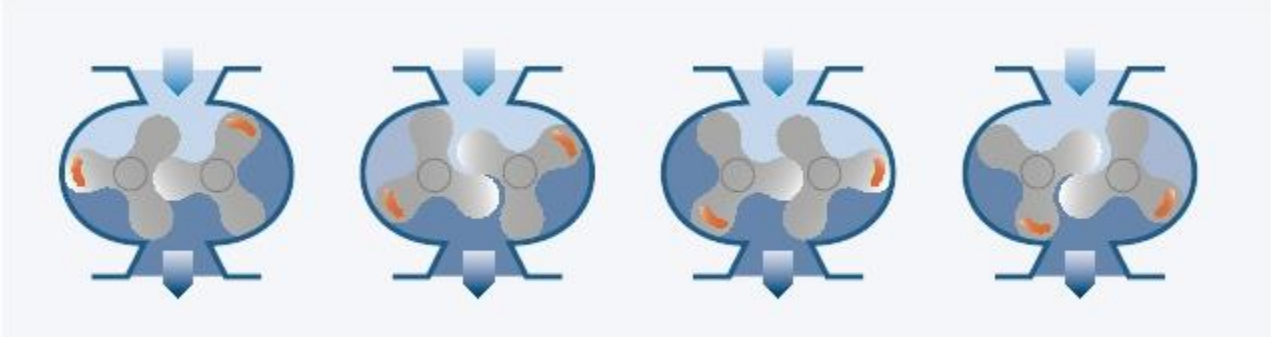
The turning of the rotors combined with the wings of the piston and the exterior walls leads to so-called conveying chambers. There is still ambient pressure in this chamber. As soon as the first wing passes the opening towards the pressure side, the system pressure is adjusted. This is called isochoric compression. The rotors close each other towards the inside, which prevents a change of pressure.

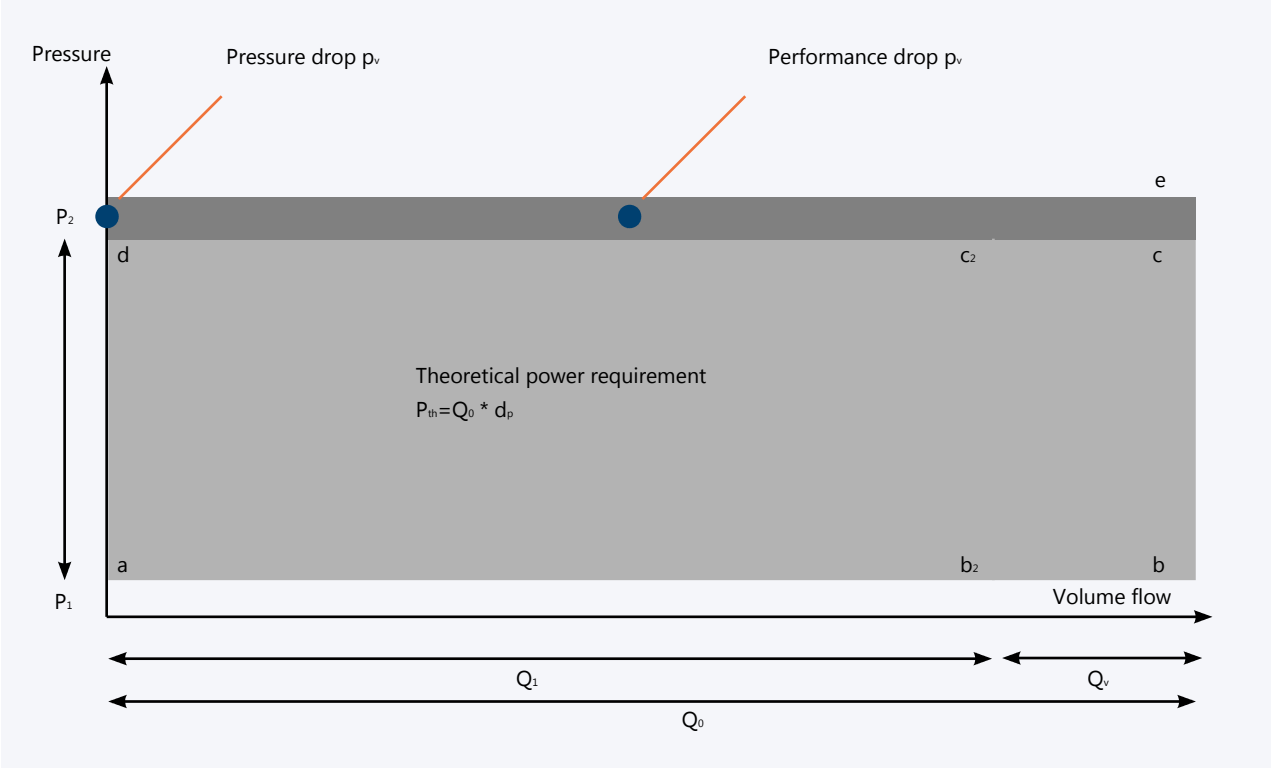
Compression principle.
In positive displacement blowers, the compression is called an isochoric compression. The pressure increase is achieved by transporting a gaseous medium (e.g. atmospheric air) discontinuously into a system. By forcing the medium from atmospheric conditions into a system with a given resistance (e.g. a water column), the relevant pressure increase is achieved. The blower must operate at a certain level to overcome this resistance. This is defined as coupling performance (Pk) in Aerzen.

Versatility in numbers
Delta Blowers are strong universal geniuses: The smallest packaged units are mounted to silo trucks.
The largest machines are operating in lifting systems. They unload transport ships. With an hourly performance of up to 1,000 tons.
· Intake volume flows from 30 $m^3$/h to 15.000 $m^3$/h
· Intake volume flows in negative pressure up to 500 mbar
· Regulation range from 25 to 100 %
· Pressures up to 1,000 mbar
· Nominal sizes DN 50 to DN 400

Applications
· Water and wastewater treatment
· Ventilation
· Backwash of filters and much more

Advantages
· Extremely robust and reliable
· oil-free as per Class 0 according to ISo 8573-1
· No absorption material in base support
· Reduced maintenance effort
· Sustainable energy efficiency






The Pressure atcorresponds outlet «pressure» p
p1: vertical axis the blower to thep2: the blower inlet

pv: Suction and pressure loss occurring at the inlet and outlet (also dependent on periphery)

Δ p : Difference between intake and discharge pressure (dp)

The ho Theoretical volume flow which is delivered by the Qvolume in
$Q_0$: the conveying chamber in the blower
Volume flow loss which is generated by the
$Q_V$: medium flowing back in the clearances of the conveying chamber (between rotor lobe and housing).
Usable volume flow
$Q_1$:

The areas resulting from this correspond to the power requirement. In principle, this can be deduced mathematically from the following formula:

From the main formula, the following can be deduced. $P_{th} = Q_0 * dp$

$P_{th}$: The theoretical power requirement $P_{th}$ is determined by the product of the theoretical volume flow and the differential pressure dp.

$$P_{th}=Q_0*d$$

The power requirement corresponds to the area a-b-c-d in the illustration above.

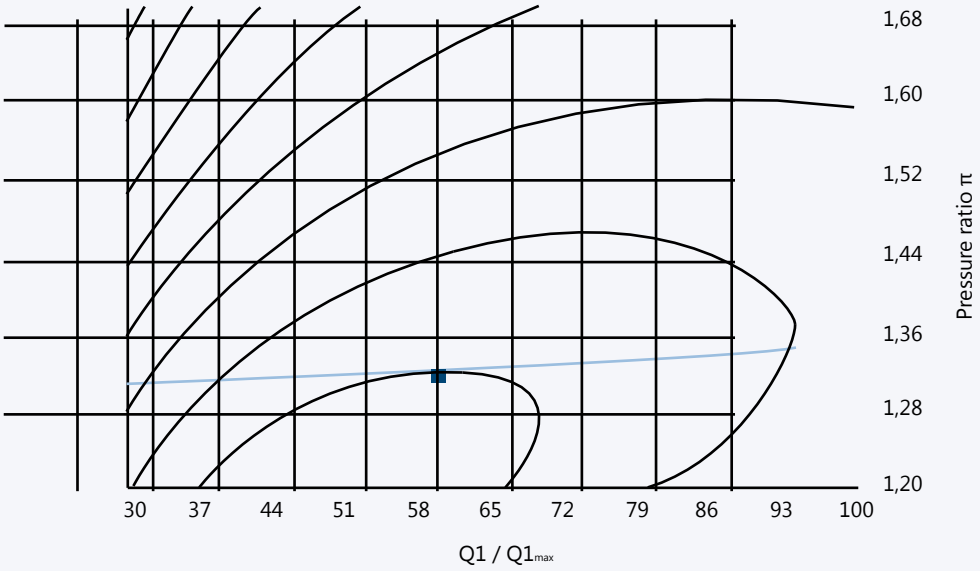
$P_K$: The coupling performance PK also considers

$$P_K=P_{th}+ P_V=Q_0*(dp+p_V)$$

The coupling performance corresponds to the area a-b-e-f.

Characteristic of the positive displacement blower
Today, they are the driving force in many processes and the heart of a strong machine group: the positive displacement blowers Delta Blower Generation 5. AERZEN has introduced many innovations with this young range. They characterise blower power for oil-free conveyance of air and neutral gases without the need for absorption materials.

For a large volume flow range of 30 to 15,000 $m_3$/h. For reduced life cycle costs. For simpler handling. For an even more quiet operation. What has not changed: This blower class, which is successful all over the world, is extremely robust, reliable and has an extremely long service life. No surprise that it is popular with long-term operations - over years and decades.



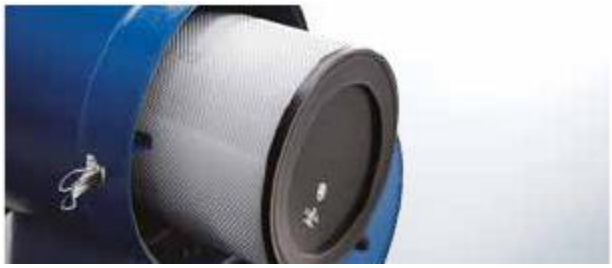

· Efficiency up to ~70%
· High control range (25% - 100%)
· Almost constant efficiency at partial load

Performance curve of a KA
Characteristic curve
Design point

# STANDARD SCOPE OF SUPPLY.

Three-lobe AERZEN Blower Stage
· Guaranteed oil-free after Class 0 by using proven piston ring labyrinth seals according to ISO 8573-1
· Three-lobe blower stage with patented pulsation decrease according to the interference principle*
· Sophisticated piston profile for high volumetric efficiency
· Statically and dynamically balanced high-quality pistons and shafts made from one piece with C 45 N / EN- GJL-200
· Friction-reduced cylinder roller bearings for a long service life
· Hardened and polished helical control gears made from case hardening steel 16MnCr5 for utmost smoothness and a long service life

*Patent DE 3527292 C2



Suction AERZEN Standard Packaged Unit
· Suction via flow-optimised acoustic hood silencer
· Absorption-material not necessary by moving the absorption material in front of the filter
· Suction silencer with integrated replaceable filter cartridge as standard according to EU4

Discharge silencer AERZEN Standard Packaged Unit
· Base frame with integrated discharge silencer with completely wear-free reflexion soundproofing principle
· Avoidance of ventilation system contamination with detached insulation material due to absorption-material-free soundproofing
· Patented base support with integrated spark arrestor certified for ATEX applications
· Broadband noise reduction over the entire speed range

AERZEN Instrumentation
· Easy reading off of values from the front of the machine
· Display of present discharge pressure
· Suction pressure gauge with an integrated maintenance indicator for the filter cartridge in suction silencer
· Reading off of oil level also possible during operation at integrated rising pipe with min. and max. display


AERZEN Standard Acoustic Hood
· Acoustic hood with sound-absorbing oxygen lining, of low flammability
· Self-supporting acoustic hood design with transport openings for forklift and lift truck and integrated oil collection tray
· Space-saving side-by-side installation
· Maintenance flaps on the front and back side for easy maintenance and revision
· oil level can be read off from the front during operation
· UV-resistant and durable powder coating in several layers
· Fresh air suction from the front side of the unit

AERZEN Belt Drive
· Fully automatic and maintenance-free belt tension
· Belt drive adapted perfectly to the required volume flow
· Simple service and replacement of V-belt
· Integrated overload protection due to load-transmitting V-belt

AERZEN Machinery Mountings
· Reduction of noise emissions through the floor due to assembly on flexible machinery mountings
· Aligning of the packaged unit is made easier by the machinery mountings

AERZEN Hinged Motor Mounting Plate
· Base frame with integrated, self-tensioning hinged motor mounting plate

AERZEN Safety Valve
· Compact structure directly at the base frame
· Standard settings are 50 mbar above system pressure
· Ensures safe operation

AERZEN Standard Motor
· Use of highly energy-efficient 2-pole motors with energy efficiency class IE3
· Motor has protection class IP54 as well as insulation class F
· Design of motors with relevant technical redundancy to ensure a long service life
· Adjusted motor weight for construction of automatic belt tensioning device via the hinged motor mounting plate
· Use of enforced bearing for compensation of resulting axial forces by the belt drive
· Re-lubrication interval significantly increased compared to the standard and therefore offers a long service interval
· Version with 3 pre-resistors as standard designed in motor terminal box to protect the motor


AERZEN
Delta Blower

# **PERFORMANCE DESCRIPTION OVERPRESSURE.** AERZEN DELTA BLoWER GENERATIoN 5.

## Pos. 1) Positive displacement blower

To be delivered as complete compact unit ready to be connected with all accessories required for safe operation. For conveying completely pure process air, oil-free operation TÜV-certified according to ISO 8573-1 of Class 0 and on the process side absolutely absorption-material-free soundproofing, to secure the air quality.

Packaged unit with CE-label and documentation, implemented according to the EC Machinery Directive 98/37 EG, Appendix II A.

Make: Aerzener Maschinenfabrik
Type: Delta Blower Generation 5

Description of blower stage
· Positive displacement blower stage for the oil-free conveying of class 0 (ISo 8573-1) and compression of air, with 3-lobe rotors and pre-inlet channels cast into the cylinder. Noise reduction due to pulsation decrease after the interference principle.
· Housing parts from EN-GJL-200, rotary pistons and shafts statically and dynamically balanced

· Blower GM 3 S to GM 80 L: Rotors and shafts made from tempered steel C45N
· Blower GM 90 S to GM 130 L: Shafts made from EN-GJS-500 Rotors made from EN-GJS-500
· Blower GM 150 S: Shafts made from tempered steel C45N Rotors made from EN-GJL-400

· Helical gears, hardened and polished, material 16MnCr5. Mounted onto the shafts with taper interference fit
· Mounting of shafts in generously dimensioned roller bearing
· oil splash lubrication with additional oil throwers
· Sealing off of conveying space with piston ring labyrinth seals and slingers, sealing off of drive shaft with radial seal ring.

Packaged unit description
· The blower is mounted onto a torsion-resistant base frame with an integrated absorption-material-free discharge silencer. Construction of the unit on flexible machinery mounting which absorbs structural noises. The discharge silencer is designed, constructed and tested in accordance with the valid rules of the Pressure Equipment Directive PED 97/23/EG (AD 2000) and is delivered with CE-labels and the relevant documentation.
· The broadband noise reduction over the entire speed range is achieved without the use of absorption materials by using metal, completely wear-free sound silencer units. A complete soundproofing effect is given over the entire usage period
· Narrow V-belt drive, belt guard (packaged unit without acoustic hood)
· Hinged motor mounting plate as tensioning device for belt drive, the automatic tensioning of the belt occurs through the weight of the motor alone. Re-adjusting support spring constructions are not necessary
· The filter silencer is flanged directly onto the inlet socket of the blower. The housing is fitted with a removable lid for maintenance purposes so that the filter element can be removed easily. The absorption material is positioned in front of the filter element when considering the flow direction.
· The temperature-resistant check valve (on shaft bearing) is integrated into the connection housing so that the flap insert can be checked easily from the outside without dismantling the housing. Blower GM 4S / DN 80 to GM 150S / DN 300. Blower GM 3S / DN 50: Connection housing for revision of check valve can be dismantled easily
· The pressure valve to secure the packaged unit is designed as an equipment part with safety function according to the Pressure Equipment Directive PED 97/23/EG.
· Connection of pressure piping with flexible rubber sleeve (ISO) with clamps at rear front or steel compensators with flange connection
· Main maintenance side: Front side
· A service package with first oil fill, oil fill funnel, lifter for hinged motor munting plate, oil drainpipe is part of the delivery scope.

Performance data

| | | | |
|---|---|---|---|
| Conveying medium | | | atmosph. air |
| Intake volume flow | $m^3$/min | : | ..... |
| Volume flow in standard condition | $Nm^3$/h | : | ..... |
| Intake pressure (abs.) | bar | : | ..... |
| Pressure increase | bar | : | ..... |
| Intake temperature | °C | : | ..... |
| Relative humidity | % | : | ..... |
| Discharge temperature | °C | : | ..... |
| Blower speed | 1/min | : | ..... |
| Motor speed | 1/min | : | ..... |
| Coupling performance | kW | : | ..... |
| Motor rating | kW | : | ..... |

*(Building tolerance for intake volume flow and coupling performance: ± 5 %)*

*Selection positions*

· Drive with constant speed
· Drive via pole-changeable motor
· Drive via frequency converter
· Suction via filter
· Suction via piping, filter with flex. pipe connection (ISO) intended for suction piping

Selected blower: GM 3 S to GM 150 S, DELTA BLoWER Generation 5

Connection pressure piping: DN .....

*Selection position:*

Connection suction piping: DN ..... only for suction via piping

Drive motor

· Motor according to IEC standard, type of construction IM B3, protection class IP 55 - Efficiency class IE 3,
- Insulation class F/according to B,
- with 3 resistor sensors for monitoring the winding,
- with re-lubrication device for bearing,
- Bearing suitable for belt drive.
- Motor suitable for operation at frequency converter.

| | | | |
|---|---|---|---|
| · Nominal voltage / nominal frequency | V / Hz | : | ..... |
| · Motor nominal capacity | kW | : | ..... |
| · Motor nominal speed | 1/min | : | ..... |
| · Motor size | | : | ..... |
| · Nominal current | A | : | ..... |
| · Starting current | A | : | ..... |

Motor start-up *(selection position)* direct star-delta at frequency converter
soft start

Start unloading device
· Pneumatic start-up relief valve Aeromat, which is necessary for star-delta-processes of the motor, is mounted onto the packaged unit
· Additional solenoid valve 230 V / 50 Hz (closed in de-energized state) is mounted onto the start-up relief, for star-delta start-up of pole-changeable motor *(selection position)*
· Solenoid valve 230 V / 50 Hz (open in de-energized state) as start-up relief. Only for unit nominal size DN 50, blower GM 3S *(selection position)*

Instrumentation
· Pressure gauge for discharge pressure with glycerine filling ø 63 mm, mounted onto the packaged unit or into the front of the acoustic hood
· Maintenance indicator for filter contamination ø 63 mm, mounted onto the packaged unit or into the front of the acoustic hood

*Selection positions*
· *Intake pressure switch for filter monitoring*
· *Discharge pressure switch*
· *Contact thermometer discharge temperature with capillary line*

*Instruments mounted onto the packaged unit, incl. impulse lines, transfer of a potential-free contact on the client's control*

Packaged unit weight: approx. ..... kg

Paint: Manufacturer standard, colour RAL 5001

| Pos.1 – deliver completely | Unit | EUR / unit |
|---|---|---|
| | | |
| | | EUR / Tot. |
| | | |

## Pos. 2) Acoustic hood

for the positive displacement blower ..... ..... DELTA BLoWER Generation 5

· Acoustic hood made from galvanised steel sheets with oil collection sump and topcoat.

· Acoustic hood suitable for transport with fork lift or lift truck (GM 3 S to GM 25 S).

· Segmented design with interior lining to reduce machine noise pressure level

from ..... dB(A) to ..... dB(A) (without piping noises)
(noise level in 1 m distance from packaged unit outline in free field, noise measurements according to DIN 45 635, DIN EN ISO 3744 and DIN EN ISO 2151)

Forced ventilation using fan wheel driven by the blower: no additional auxiliary drive necessary.

Inlet openings: at the front on the cold side of the packaged unit,
Outlet openings: at the rear on the warm side of the packaged unit.

Main operating and maintenance side: anterior front side with removable, generous segments

Posterior front side: with removable segment for user-friendly accessibility to pressure valve and start unloading device

Blower GM 4S / DN 80 to GM 90S / DN 250.
· oil level control display integrated into the outside of the front of the acoustic hood (main operating side).
· The oil level can be checked from the outside without opening the acoustic hood when the blower is running.
· oil can be filled up or drained simply via the integrated fill-up tank.
· The oil system is ready to use complete with piping.

Blower GM 3S / DN 50:
· The oil level can be checked after simply removing the roof segment.
· oil can be filled up using the supplied oil containers. It can be drained using the drainage valves attached to the blower using the supplied drainage hose.

Acoustic hood designed for the arrangement of several packaged units next to each other (GM 3S / DN 50 to GM 150 S / DN 300).
· Acoustic hood for inside installation (standard)

*Selection position:* · *Acoustic hood for outside installation*

Hood weight: approx. ..... kg

Paint: Manufacturer standard, colour RAL 5001 / front elements RAL 7047, powder painting

## Pos. 3) Selection position: AERZEN Blower control AERtronic

The packaged unit is equipped with the operating and control device AERtronic, which takes on the following tasks:
· Control of the client's power cabinet (star-delta circuit, direct operation or frequency converter)
· Monitor limit values of the rotary lobe compressor
· Capture, visualise and save measurement data
· Count operating and service hours
· Display and record events

AERZEN control unit AS 300 B AERtronic:
· For the operation/monitoring of a positive displacement blower and the control of the client's own or optional power cabinet
· Visualisation and saving of operating data
· Provision of service, error and maintenance information, navigation and operation via TouchScreen
· operating hour counter, monitoring of winding temperature of drive motor as well as monitoring of intake pressure (filter contamination), discharge pressure, oil pressure as well as discharge temperature.
· Basic module and extension modules with digital and analogue inlets/outlets.

Including:
· Transmitter for intake pressure, discharge pressure
· Sensors for discharge temperature.
· Supply voltage 380-420 V 50Hz.

| Pos.3 – deliver completely | Unit | EUR/unit |
|---|---|---|
| | | |
| | | EUR/Tot. |
| | | |

Selection positions at extra cost (from DN 100 integrated into the acoustic hood)
· *Extension with frequency converter module, Outlet signal 4 - 20mA*
· *Extension with interface module RS 485 (2-wire) for the connection with the Profibus-DP*
· *Extension for the visualisation of the PCH vibration monitoring*
· *Impedance corrector to Aertronic for special voltages*

Power supply panel: available extra

# MAINTENANCE AND REVISION

The following table describes the standard maintenance for AERZEN positive displacement blowers: Delta Blower Generation 5.

Maintenance for 1 year

| Amount | Maintenance part | Interval |
|---|---|---|
| 1 | Replace intake filter | After 8000 Oh or annually |

Maintenance for 2 years

| Amount | Maintenance part | Interval |
|---|---|---|
| 2 | Replace intake filter | After 8000 Oh or annually |
| 1 | Replace V-belt | After 16000 Oh or after 2 years |
| 1 | Replace lubrication oil DELTA LUBE 06 | After 16000 Oh or after 2 years |

Maintenance for 5 years

| Amount | Maintenance part | Interval |
|---|---|---|
| 4 | Replace intake filter | After 8000 Oh or annually |
| 2 | Replace V-belt | After 16000 Oh or after 2 years |
| 2 | Replace lubrication oil DELTA LUBE 06 | After 16000 Oh or after 2 years |

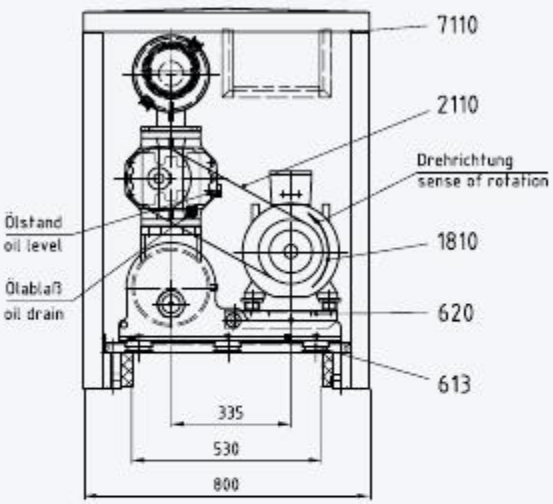
Revision

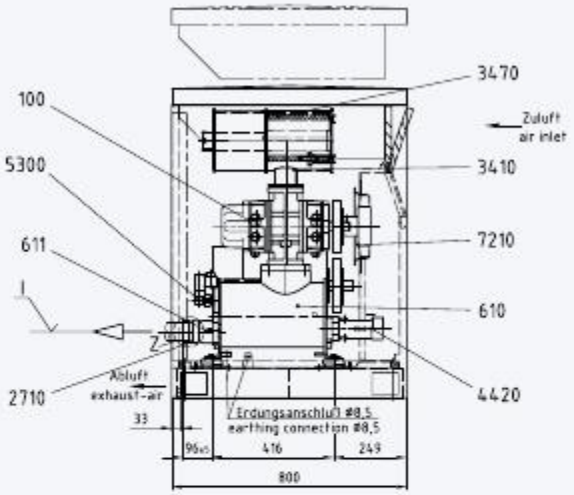
| Amount | Revision part | Interval |
|---|---|---|
| 1 | Set seals | After 20000 Oh or after 3 years |
| 1 | Set bearings | After 20000 Oh or after 3 years |

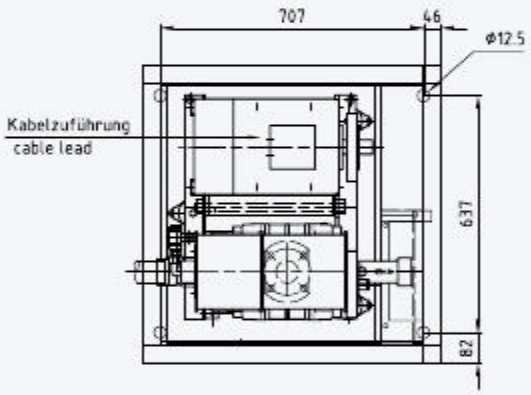
*Oh = operating hours*
*Note: All intervals specified are manufacturer's recommendations.*

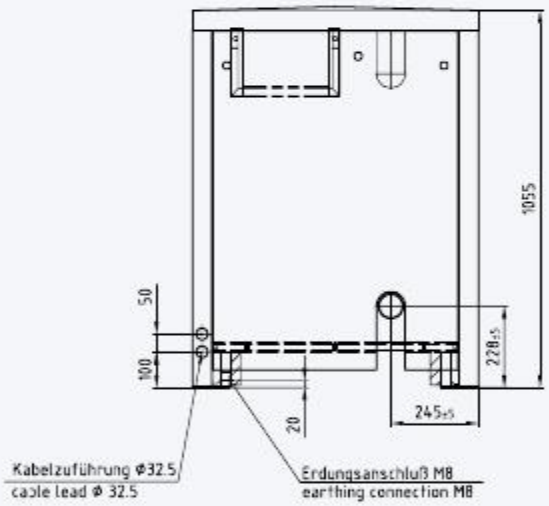
# TECHNICAL DRAWINGS.

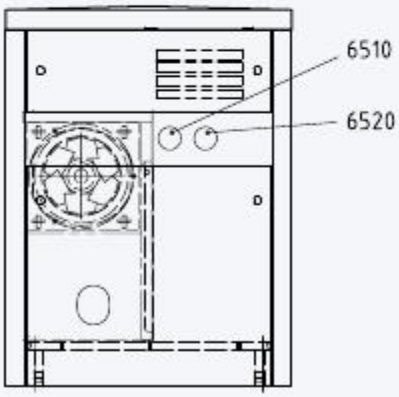
## DELTA BLOWER GM 3 S



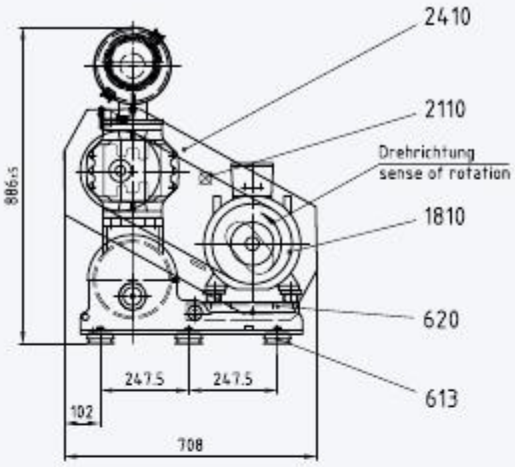



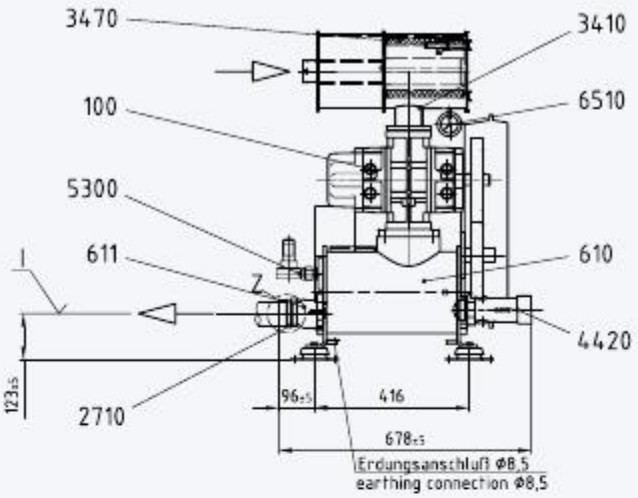



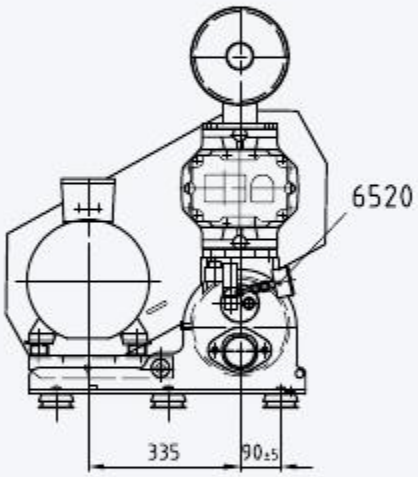



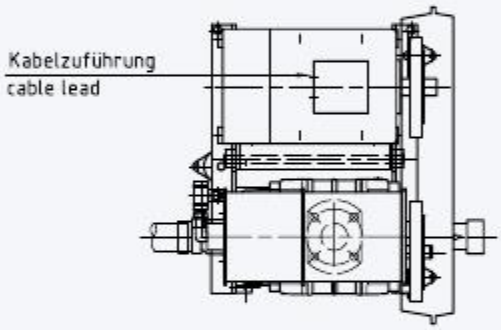

| Pos. | Benennung | Description |
|---|---|---|
| 100 | Gebläse | Blower |
| 610 | Grundträger | Base frame |
| 611 | Rohrstutzen mit integr. Rückschlagklappe | Pipe socket with integr. check valve |
| 613 | Elastischer Maschinenfuß | Flexible machinery mounting |
| 620 | Motorwippe | Hinged motor mounting plate |
| 1810 | Motor | Motor |
| 2110 | Riementrieb | Belt drive |
| 2710 | Elastische Rohrverbindung DS | Flexible pipe connection DS |
| 3410 | Filterschalldämpfer | Filter silencer |
| 3470 | Ansaugfilter | Inlet filter |
| 4420 | Druckventil | Pressure valve |
| 5300 | Sonderzubehör: Anfahrentlastung | Extras: start unloading device |
| 6510 | Wartungsanzeiger | Service indicator |
| 6520 | Manometer | Pressure gauge |
| 7110 | Schallhaube | Acoustic hood |
| 7210 | Ventilator | Fan |

*Drawing no.: 2ZG-9212*



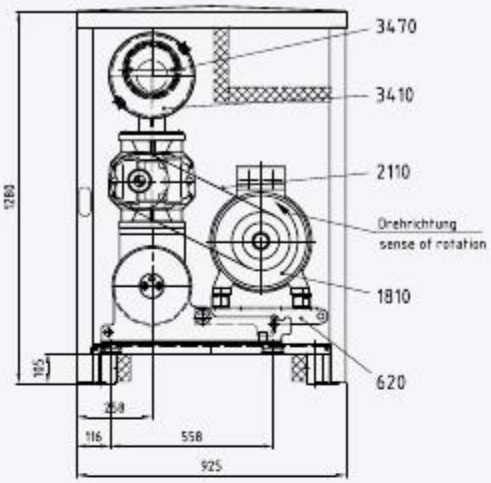



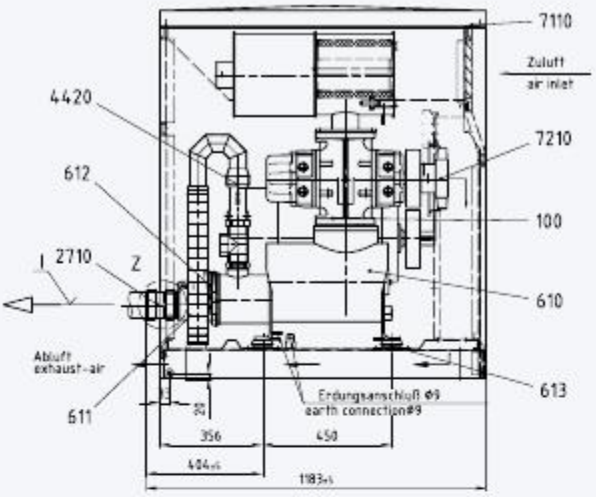



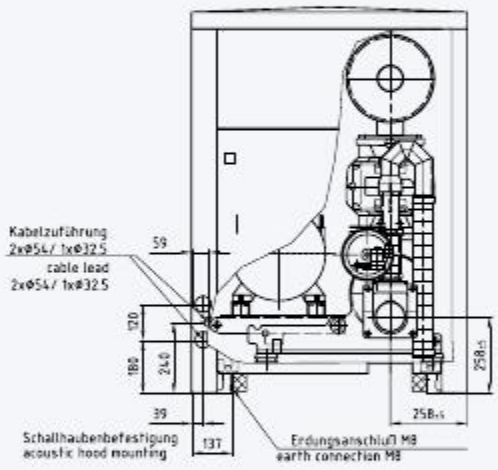

| Pos. | Benennung | Description |
|---|---|---|
| 100 | Gebläse | Blower |
| 610 | Grundträger | Base frame |
| 611 | Rohrstutzen mit integr. Rückschlagklappe | Pipe socket with integr. check valve |
| 613 | Elastischer Maschinenfuß | Flexible machinery mounting |
| 620 | Motorwippe | Hinged motor mounting plate |
| 1810 | Motor | Motor |
| 2110 | Riementrieb | Belt drive |
| 2410 | Riemenschutz | Belt guard |
| 2710 | Elastische Rohrverbindung DS | Flexible pipe connection DC |
| 3410 | Filterschalldämpfer | Filter silencer |
| 3470 | Ansaugfilter | Inlet filter |
| 4420 | Druckventil | Pressure valve |
| 5300 | Sonderzubehör: Anfahrentlastung | Extras: start unloading device |
| 6510 | Wartungsanzeiger | Service indicator |
| 6520 | Manometer | Pressure gauge |

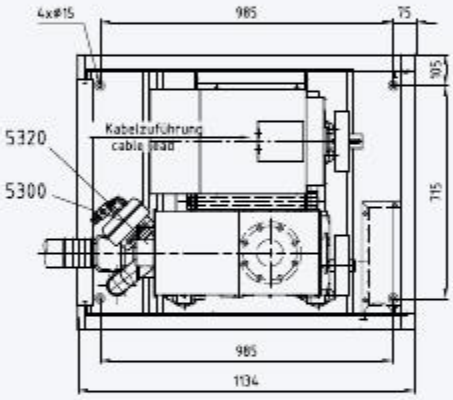
*Drawing no.: 2ZG-9215*

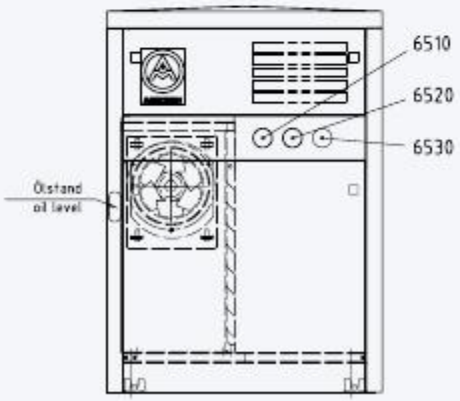
# DELTA BLOWER GM 4 S



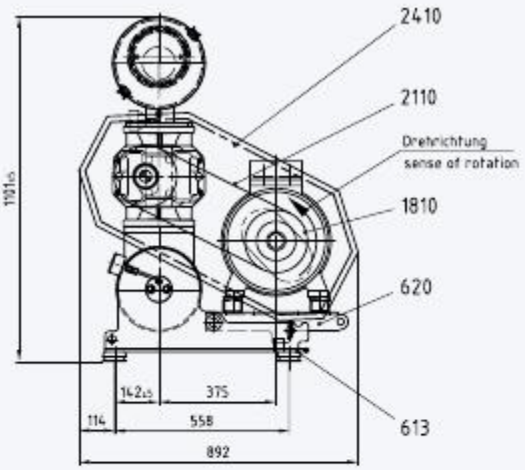



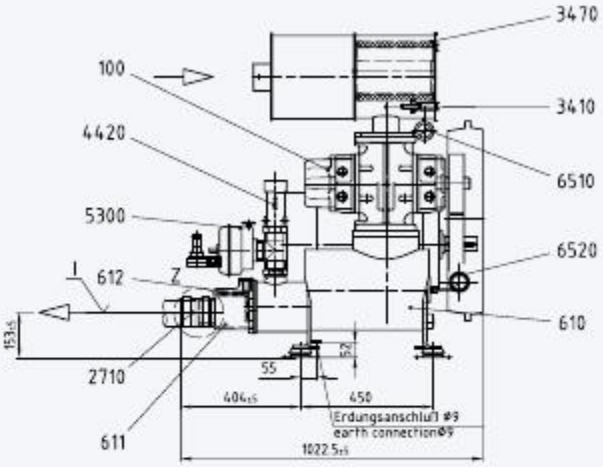



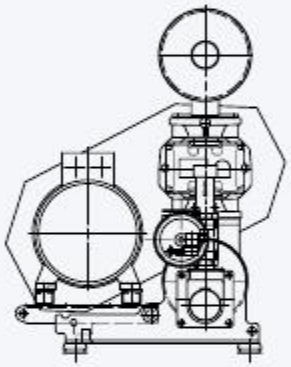



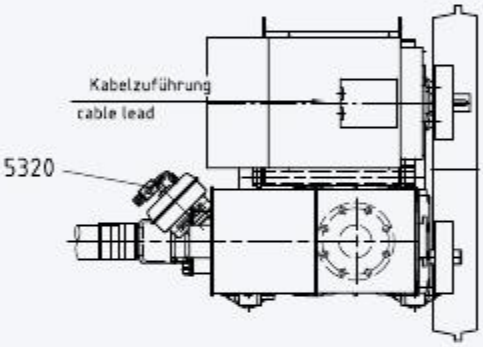

| Pos. | Benennung | Description |
|---|---|---|
| 100 | Gebläse | Blower |
| 610 | Grundträger | Base frame |
| 611 | Anschlussgehäuse | Connection housing |
| 612 | Rückschlagklappe | Check valve |
| 613 | Elastischer Maschinenfuß | Flexible machinery mounting |
| 620 | Motorwippe | Hinged motor mounting plate |
| 1810 | Motor | Motor |
| 2110 | Riementrieb | Belt drive |
| 2710 | Elastische Rohrverbindung DS | Flexible pipe connection DS |
| 3410 | Filterschalldämpfer | Filter silencer |
| 3470 | Ansaugfilter | Inlet filter |
| 4420 | Druckventil | Pressure valve |
| 5300 | Sonderzubehör: Anfahrentlastung | Extras: start unloading device |
| 5320 | Sonderzubehör: Magnetventil | Extras: solenoid valve |
| 6510 | Wartungsanzeiger | Service indicator |
| 6520 | Manometer | Pressure gauge |
| 6530 | Option: Kontakt-Thermometer | Extras: contact thermometer |
| 7110 | Schallhaube | Acoustic hood |
| 7210 | Ventilator | Fan |

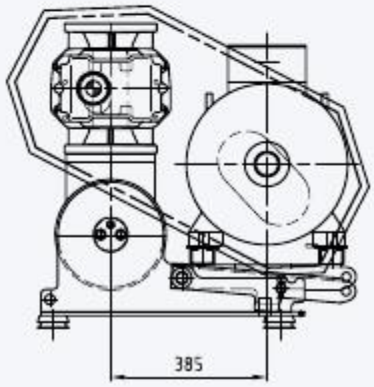
*Drawing no.: ZG-00798*





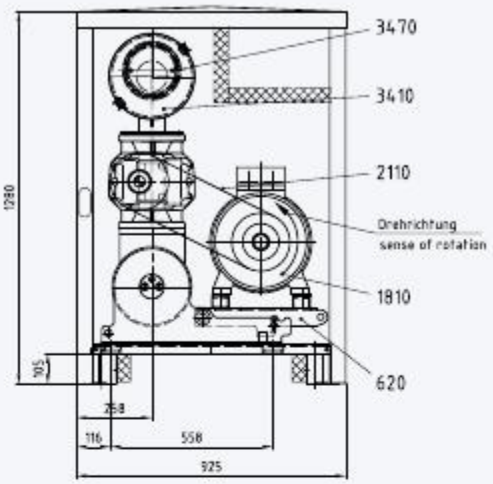

Motoraufbau beim GM 10 S mit Motor 200 L

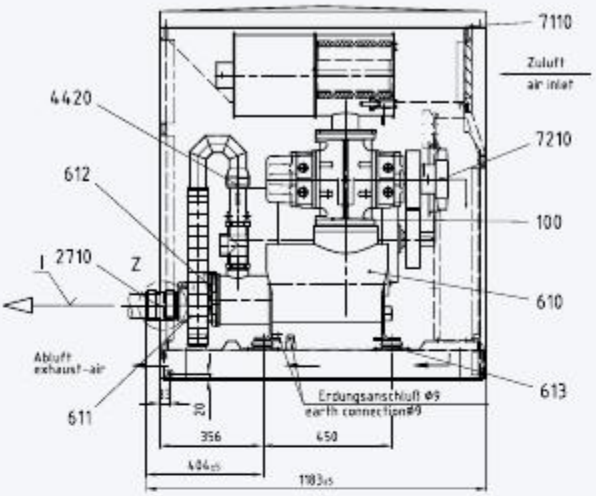
Motor design of GM 10 S with motor 200 L

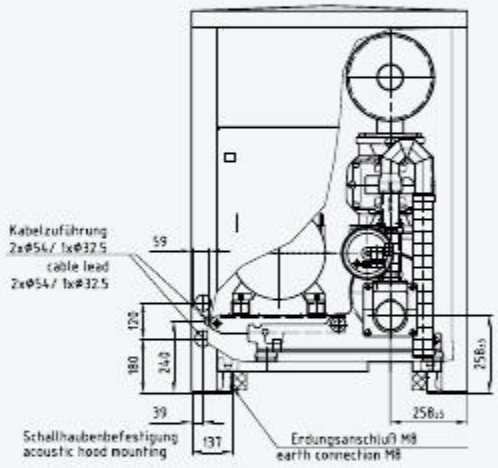
| Pos. | Benennung | Description |
|---|---|---|
| 100 | Gebläse | Blower |
| 610 | Grundträger | Base frame |
| 611 | Anschlussgehäuse | Connection housing |
| 612 | Rückschlagklappe | Check valve |
| 613 | Elastischer Maschinenfuß | Flexible machinery mounting |
| 620 | Motorwippe | Hinged motor mounting plate |
| 1810 | Motor | Motor |
| 2110 | Riementrieb | Belt drive |
| 2410 | Riemenschutz | Belt guard |
| 2710 | Elastische Rohrverbindung DS | Flexible pipe connection DS |
| 3410 | Filterschalldämpfer | Filter silencer |
| 3470 | Ansaugfilter | Inlet filter |
| 4420 | Druckventil | Pressure valve |
| 5300 | Sonderzubehör: Anfahrentlastung | Extras: start unloading device |
| 5320 | Sonderzubehör: Magnetventil | Extras: solenoid valve |
| 6510 | Wartungsanzeiger | Service indicator |
| 6520 | Manometer | Pressure gauge |
| 7210 | Ventilator | Fan |

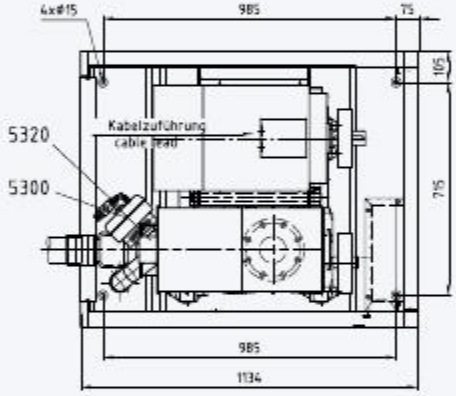
*Drawing no.: ZG-00824*

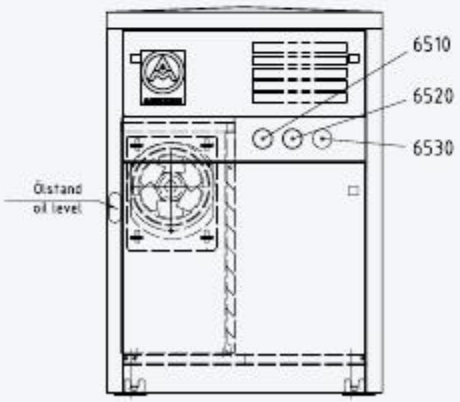
# DELTA BLOWER GM 7 L



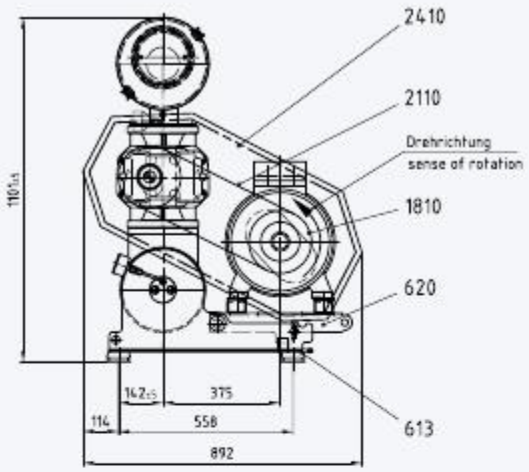



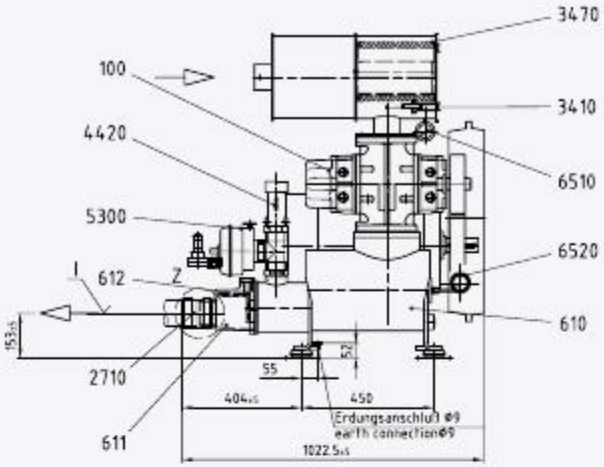



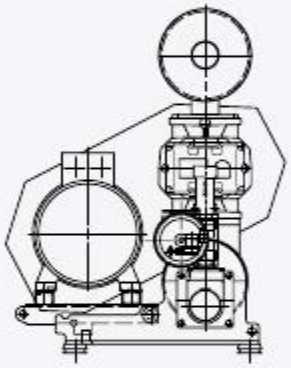



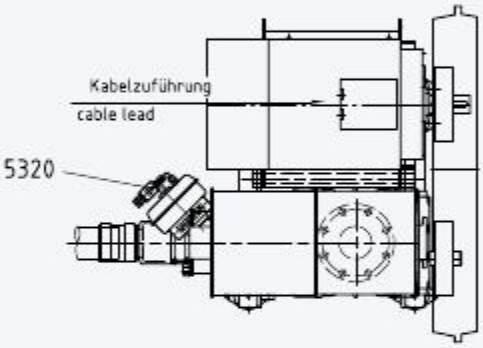

| Pos. | Benennung | Description |
|---|---|---|
| 100 | Gebläse | Blower |
| 610 | Grundträger | Base frame |
| 611 | Anschlussgehäuse | Connection housing |
| 612 | Rückschlagklappe | Check valve |
| 613 | Elastischer Maschinenfuß | Flexible machinery mounting |
| 620 | Motorwippe | Hinged motor mounting plate |
| 1810 | Motor | Motor |
| 2110 | Riementrieb | Belt drive |
| 2710 | Elastische Rohrverbindung DS | Flexible pipe connection DS |
| 3410 | Filterschalldämpfer | Filter silencer |
| 3470 | Ansaugfilter | Inlet filter |
| 4420 | Druckventil | Pressure valve |
| 5300 | Sonderzubehör: Anfahrentlastung | Extras: start unloading device |
| 5320 | Sonderzubehör: Magnetventil | Extras: solenoid valve |
| 6510 | Wartungsanzeiger | Service indicator |
| 6520 | Manometer | Pressure gauge |
| 6530 | Option: Kontakt-Thermometer | Extras: contact thermometer |
| 7110 | Schallhaube | Acoustic hood |
| 7210 | Ventilator | Fan |

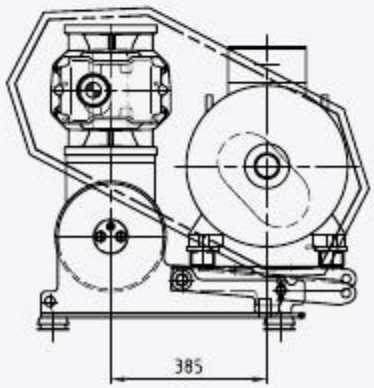
*Drawing no.: ZG-00798*





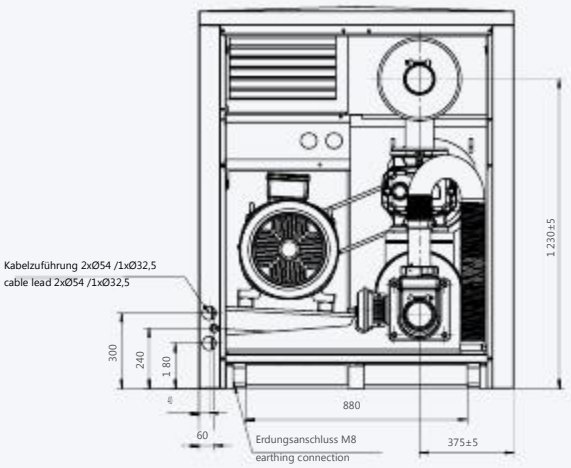

Motoraufbau beim GM 10 S mit Motor 200 L

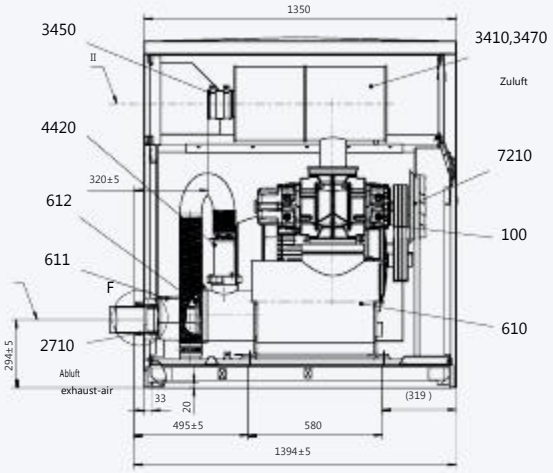
Motor design of GM 10 S with motor 200 L

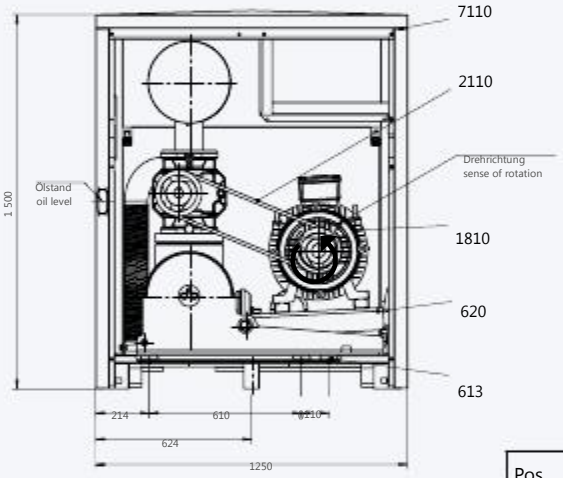
| Pos. | Benennung | Description |
|---|---|---|
| 100 | Gebläse | Blower |
| 610 | Grundträger | Base frame |
| 611 | Anschlussgehäuse | Connection housing |
| 612 | Rückschlagklappe | Check valve |
| 613 | Elastischer Maschinenfuß | Flexible machinery mounting |
| 620 | Motorwippe | Hinged motor mounting plate |
| 1810 | Motor | Motor |
| 2110 | Riementrieb | Belt drive |
| 2410 | Riemenschutz | Belt guard |
| 2710 | Elastische Rohrverbindung DS | Flexible pipe connection DS |
| 3410 | Filterschalldämpfer | Filter silencer |
| 3470 | Ansaugfilter | Inlet filter |
| 4420 | Druckventil | Pressure valve |
| 5300 | Sonderzubehör: Anfahrentlastung | Extras: start unloading device |
| 5320 | Sonderzubehör: Magnetventil | Extras: solenoid valve |
| 6510 | Wartungsanzeiger | Service indicator |
| 6520 | Manometer | Pressure gauge |
| 7210 | Ventilator | Fan |

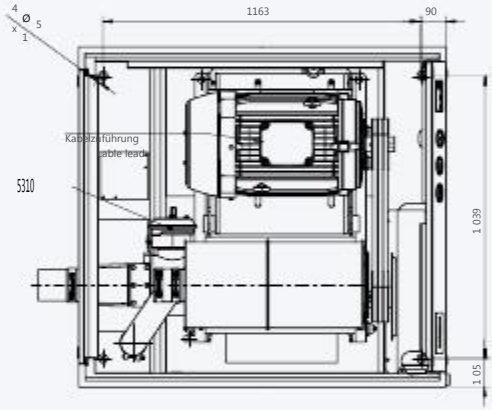
*Drawing no.: ZG-00824*

# DELTA BLOWER GM 10 S



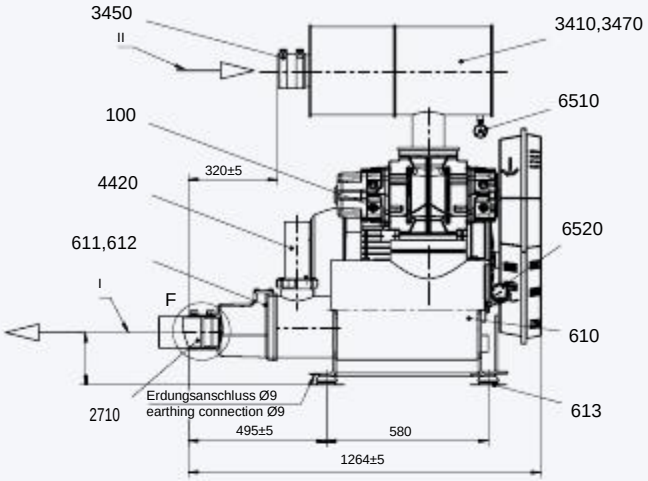



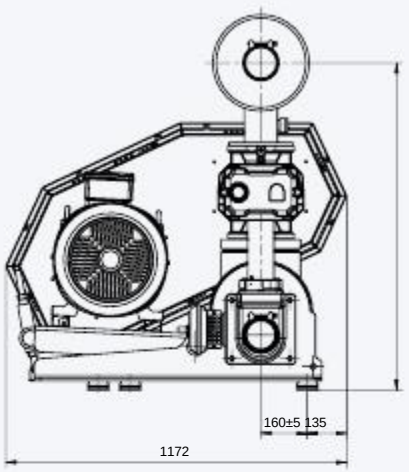



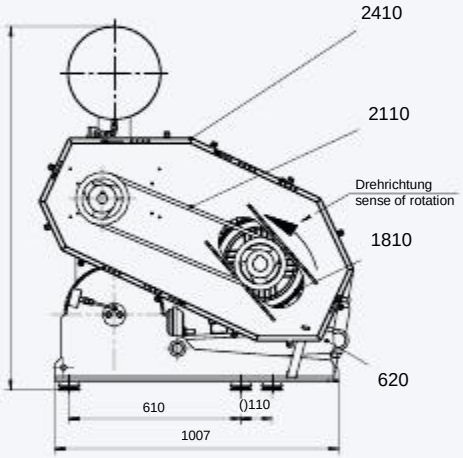



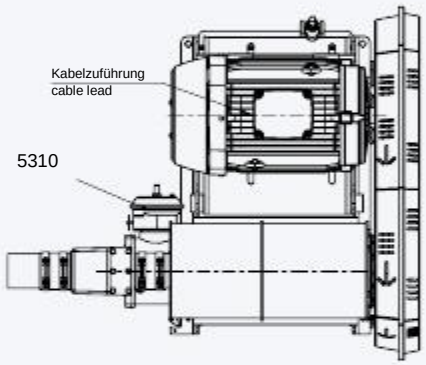

| Pos. | Benennung | Description |
|---|---|---|
| 100 | Gebläse | Blower |
| 610 | Grundträger | Base frame |
| 611 | Anschlussgehäuse | Connection housing |
| 612 | Rückschlagklappe | Check valve |
| 613 | Elastischer Maschinenfuß | Flexible machinery mounting |
| 620 | Motorwippe | Hinged motor mounting plate |
| 1810 | Motor | Motor |
| 2110 | Riementrieb | Belt drive |
| 2710 | Elastische Rohrverbindung DS | Flexible pipe connection DS |
| 3410 | Filterschalldämpfer | Filter silencer |
| 3470 | Ansaugfilter | Inlet filter |
| 3450 | Option: Elastische Rohrverbindung SS | Optional: flexible pipe connection SS |
| 4420 | Druckventil | Pressure valve |
| 5310 | Option: Anfahrentlastung | Optional: start unloading device |
| 6510 | Wartungsanzeiger | Service indicator |
| 6520 | Manometer | Pressure gauge |
| 6530 | Option: Kontakt-Thermometer | Extras: contact thermometer |
| 7110 | Schallhaube | Acoustic hood |
| 7210 | Ventilator | Fan |

*Drawing no.: 4000146592*



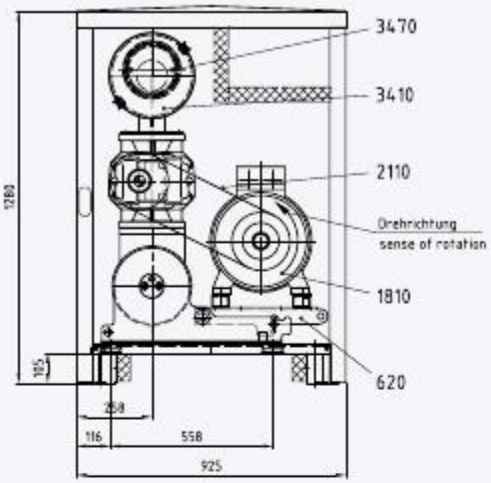



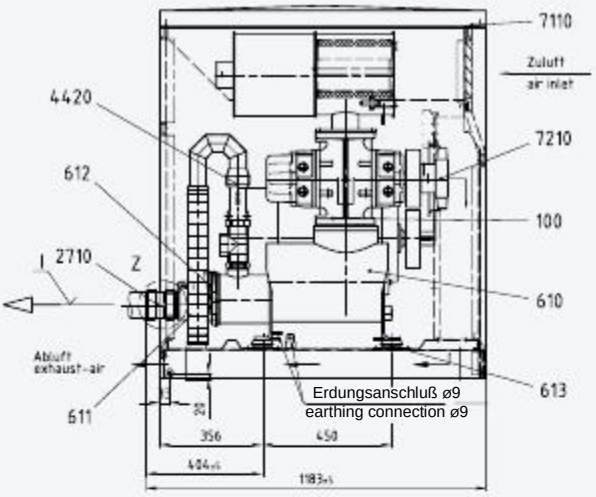

Freiraum für Wartungsarbeiten Stirnseite 800min. 800mm
Free space for maintenance work at front side packaged unit 800mm min.

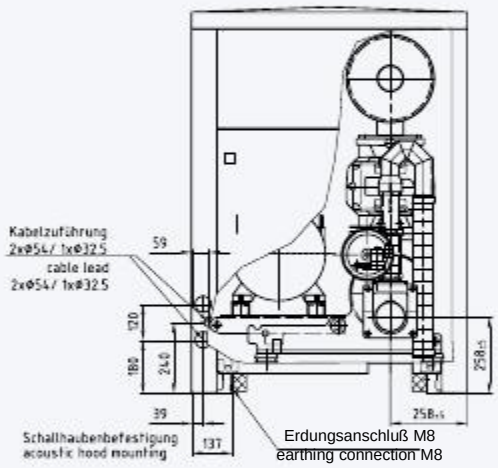
| Pos. | Benennung | Description |
|---|---|---|
| 100 | Gebläse | Blower |
| 610 | Grundträger | Base frame |
| 611 | Anschlussgehäuse | Connection housing |
| 612 | Rückschlagklappe | Check valve |
| 613 | Elastischer Maschinenfuß | Flexible machinery mounting |
| 620 | Motorwippe | Hinged motor mounting plate |
| 1810 | Motor | Motor |
| 2110 | Riementrieb | Belt drive |
| 2410 | Riemenschutz | Belt guard |
| 2710 | Elastische Rohrverbindung DS | Flexible pipe connection DS |
| 3410 | Saugschalldämpfer | Suction silencer |
| 3470 | Ansaugfilter | Inlet filter |
| 3450 | Option: Elastische Rohrverbindung SS | Optional: flexible pipe connection SS |
| 4420 | Druckventil | Pressure valve |
| 5310 | Option: Anfahrentlastung | Optional: start unloading device |
| 6510 | Wartungsanzeiger | Service indicator |
| 6520 | Manometer | Pressure gauge |
| 7210 | Ventilator | Fan |

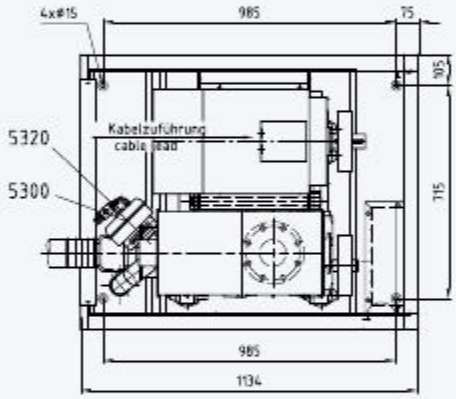
*Drawing no.: 4000150127*

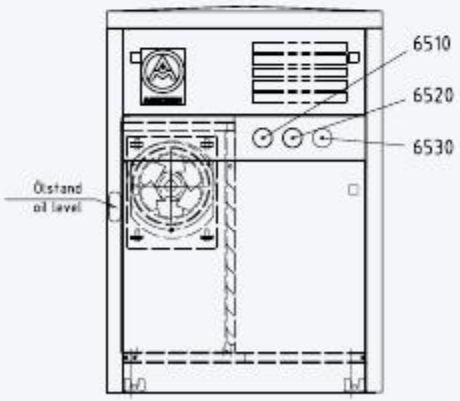
# DELTA BLOWER GM 10 S



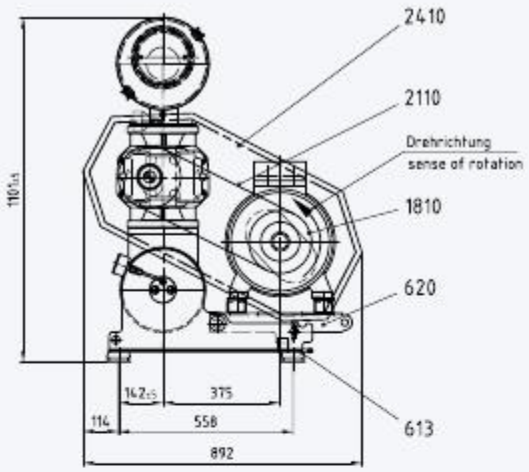



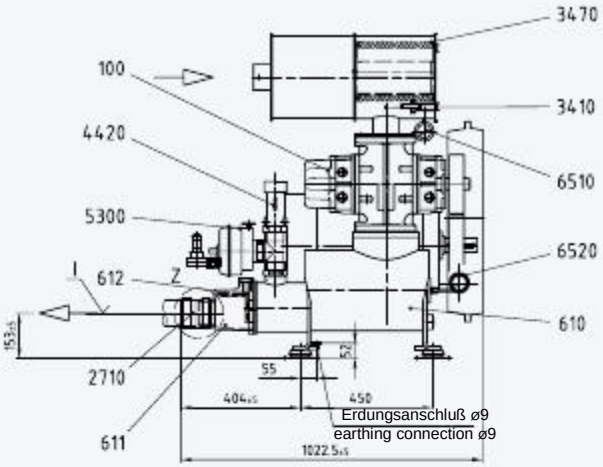



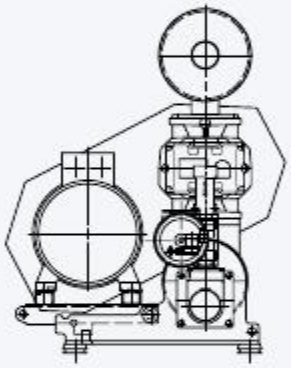



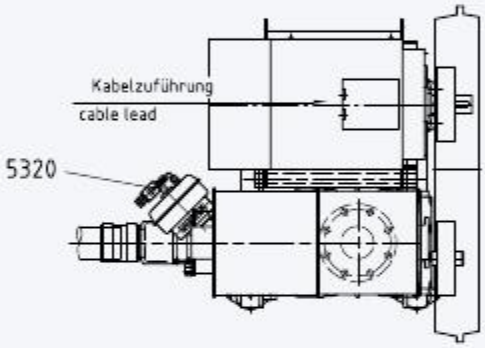

| Pos. | Benennung | Description |
|---|---|---|
| 100 | Gebläse | Blower |
| 610 | Grundträger | Base frame |
| 611 | Anschlussgehäuse | Connection housing |
| 612 | Rückschlagklappe | Check valve |
| 613 | Elastischer Maschinenfuß | Flexible machinery mounting |
| 620 | Motorwippe | Hinged motor mounting plate |
| 1810 | Motor | Motor |
| 2110 | Riementrieb | Belt drive |
| 2710 | Elastische Rohrverbindung DS | Flexible pipe connection DS |
| 3410 | Filterschalldämpfer | Filter silencer |
| 3470 | Ansaugfilter | Inlet filter |
| 4420 | Druckventil | Pressure valve |
| 5300 | Sonderzubehör: Anfahrentlastung | Extras: start unloading device |
| 5320 | Sonderzubehör: Magnetventil | Extras: solenoid valve |
| 6510 | Wartungsanzeiger | Service indicator |
| 6520 | Manometer | Pressure gauge |
| 6530 | Option: Kontakt-Thermometer | Extras: contact thermometer |
| 7110 | Schallhaube | Acoustic hood |
| 7210 | Ventilator | Fan |

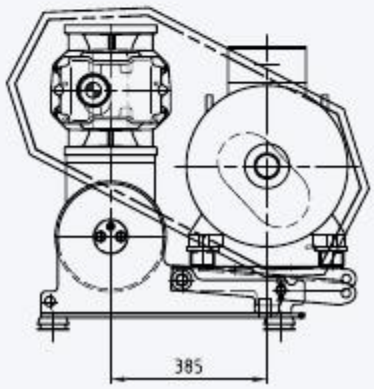
*Drawing no.: ZG-00798*





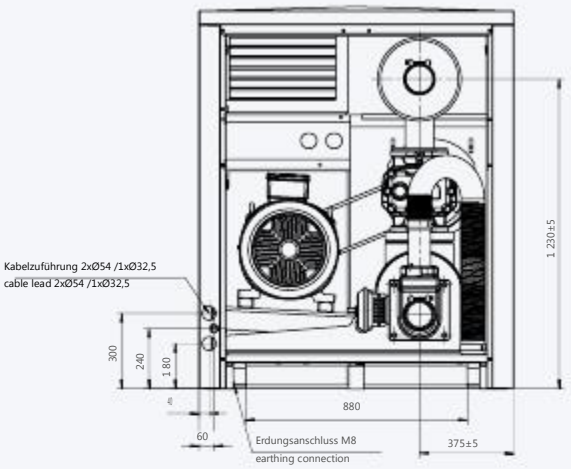

Motoraufbau beim GM 10 S mit Motor 200 L

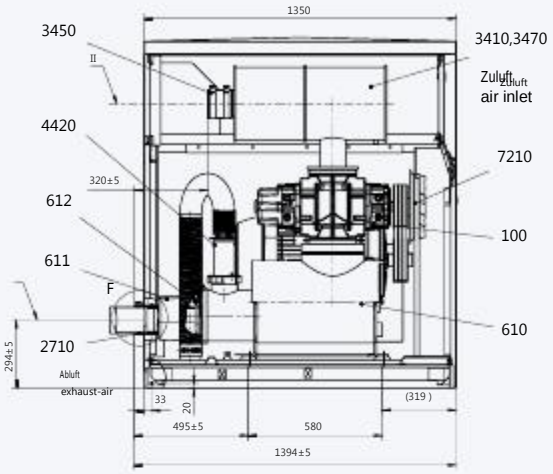
Motor design of GM 10 S with motor 200 L

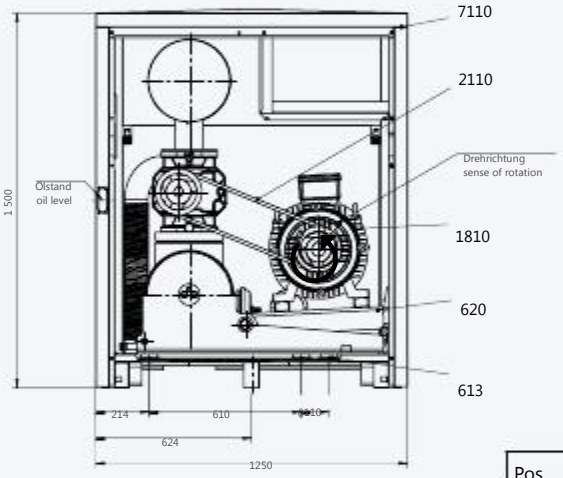
| Pos. | Benennung | Description |
|---|---|---|
| 100 | Gebläse | Blower |
| 610 | Grundträger | Base frame |
| 611 | Anschlussgehäuse | Connection housing |
| 612 | Rückschlagklappe | Check valve |
| 613 | Elastischer Maschinenfuß | Flexible machinery mounting |
| 620 | Motorwippe | Hinged motor mounting plate |
| 1810 | Motor | Motor |
| 2110 | Riementrieb | Belt drive |
| 2410 | Riemenschutz | Belt guard |
| 2710 | Elastische Rohrverbindung DS | Flexible pipe connection DS |
| 3410 | Filterschalldämpfer | Filter silencer |
| 3470 | Ansaugfilter | Inlet filter |
| 4420 | Druckventil | Pressure valve |
| 5300 | Sonderzubehör: Anfahrentlastung | Extras: start unloading device |
| 5320 | Sonderzubehör: Magnetventil | Extras: solenoid valve |
| 6510 | Wartungsanzeiger | Service indicator |
| 6520 | Manometer | Pressure gauge |
| 7210 | Ventilator | Fan |

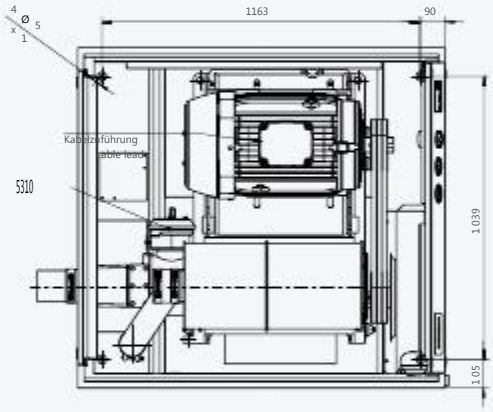
*Drawing no.: ZG-00824*

# DELTA BLOWER GM 15 L



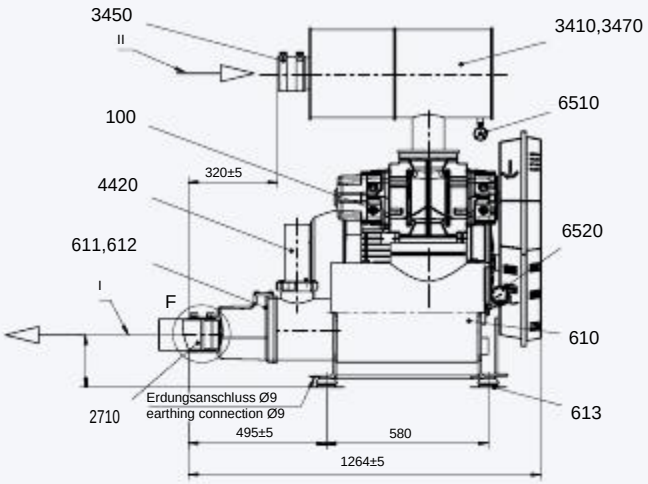



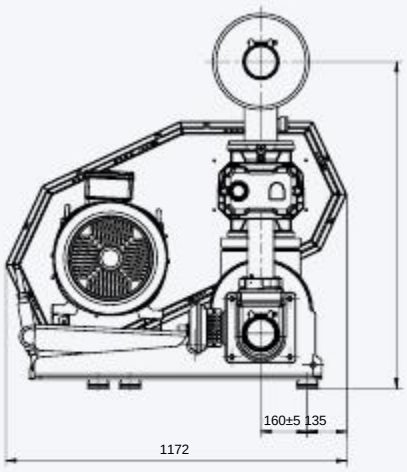



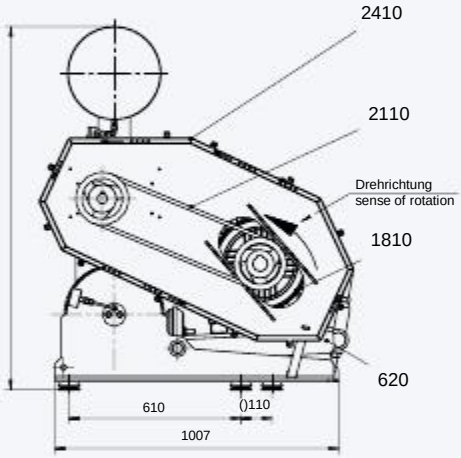



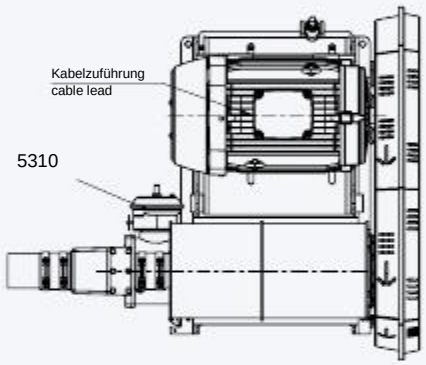

| Pos. | Benennung | Description |
|---|---|---|
| 100 | Gebläse | Blower |
| 610 | Grundträger | Base frame |
| 611 | Anschlussgehäuse | Connection housing |
| 612 | Rückschlagklappe | Check valve |
| 613 | Elastischer Maschinenfuß | Flexible machinery mounting |
| 620 | Motorwippe | Hinged motor mounting plate |
| 1810 | Motor | Motor |
| 2110 | Riementrieb | Belt drive |
| 2710 | Elastische Rohrverbindung DS | Flexible pipe connection DS |
| 3410 | Filterschalldämpfer | Filter silencer |
| 3470 | Ansaugfilter | Inlet filter |
| 3450 | Option: Elastische Rohrverbindung SS | Optional: flexible pipe connection SS |
| 4420 | Druckventil | Pressure valve |
| 5310 | Option: Anfahrentlastung | Optional: start unloading device |
| 6510 | Wartungsanzeiger | Service indicator |
| 6520 | Manometer | Pressure gauge |
| 6530 | Option: Kontakt-Thermometer | Extras: contact thermometer |
| 7110 | Schallhaube | Acoustic hood |
| 7210 | Ventilator | Fan |

*Drawing no.: 4000146592*



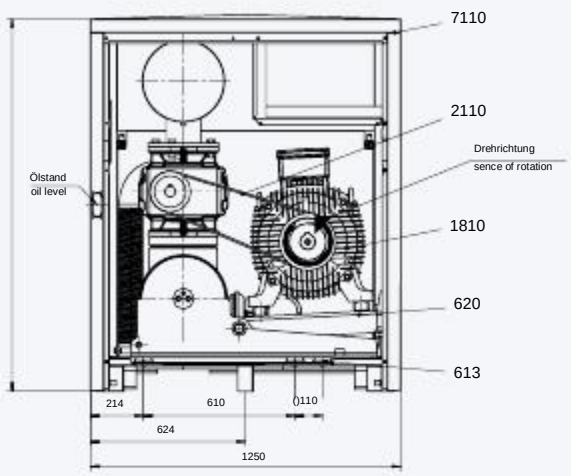



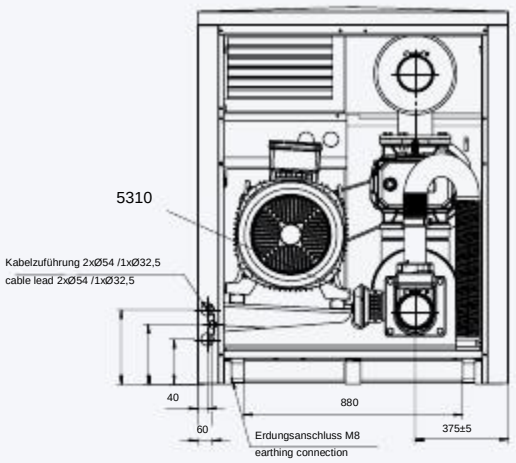

Freiraum für Wartungsarbeiten Stirnseitig min. 800mm
Free space for maintenance work at front side of unit 800mm min.

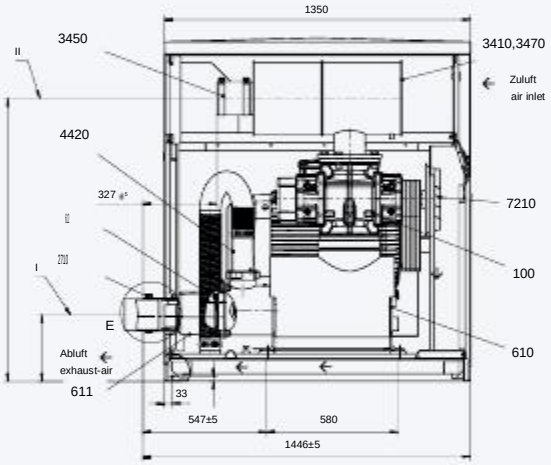
| Pos. | Benennung | Description |
|---|---|---|
| 100 | Gebläse | Blower |
| 610 | Grundträger | Base frame |
| 611 | Anschlussgehäuse | Connection housing |
| 612 | Rückschlagklappe | Check valve |
| 613 | Elastischer Maschinenfuß | Flexible machinery mounting |
| 620 | Motorwippe | Hinged motor mounting plate |
| 1810 | Motor | Motor |
| 2110 | Riementrieb | Belt drive |
| 2410 | Riemenschutz | Belt guard |
| 2710 | Elastische Rohrverbindung DS | Flexible pipe connection DS |
| 3410 | Saugschalldämpfer | Suction silencer |
| 3470 | Ansaugfilter | Inlet filter |
| 3450 | Option: Elastische Rohrverbindung SS | Optional: flexible pipe connection SS |
| 4420 | Druckventil | Pressure valve |
| 5310 | Option: Anfahrentlastung | Optional: start unloading device |
| 6510 | Wartungsanzeiger | Service indicator |
| 6520 | Manometer | Pressure gauge |
| 7210 | Ventilator | Fan |

*Drawing no.: 4000150127*

# DELTA BLOWER GM 25 S

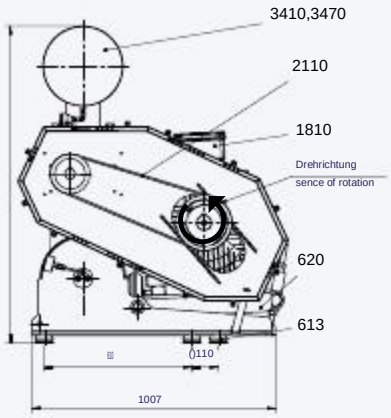


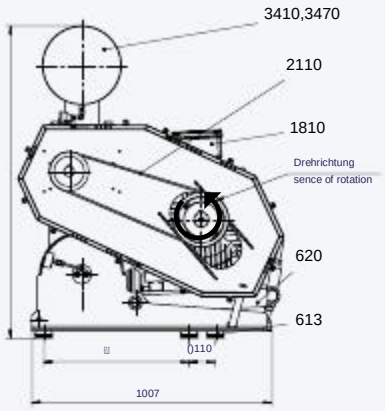



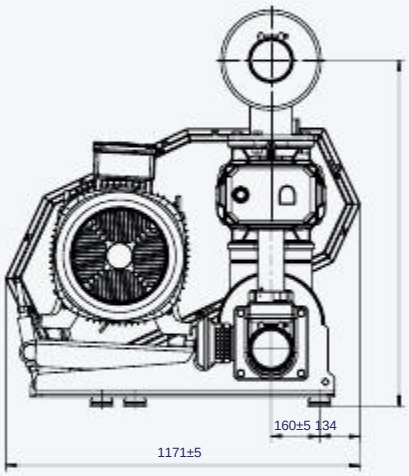



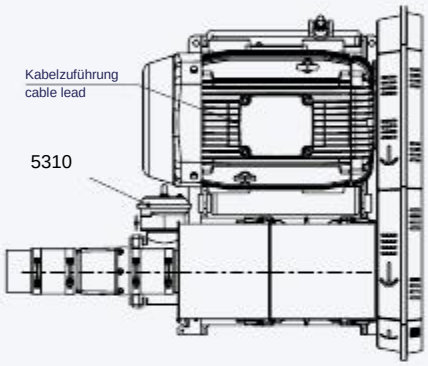

| Pos. | Benennung | Description |
|---|---|---|
| 100 | Gebläse | Blower |
| 610 | Grundträger | Base frame |
| 611 | Anschlussgehäuse | Connection housing |
| 612 | Rückschlagklappe | Check valve |
| 613 | Elastischer Maschinenfuß | Flexible machinery mounting |
| 620 | Motorwippe | Hinged motor mounting plate |
| 1810 | Motor | Motor |
| 2110 | Riementrieb | Belt drive |
| 2710 | Elastische Rohrverbindung DS | Flexible pipe connection DS |
| 3410 | Filterschalldämpfer | Filter silencer |
| 3470 | Ansaugfilter | Inlet filter |
| 3450 | Option: Elastische Rohrverbindung SS | Optional: flexible pipe connection SS |
| 4420 | Druckventil | Pressure valve |
| 5310 | Option: Anfahrentlastung | Optional: start unloading device |
| 6510 | Wartungsanzeiger | Service indicator |
| 6520 | Manometer | Pressure gauge |
| 6530 | Option: Kontakt-Thermometer | Extras: contact thermometer |
| 7110 | Schallhaube | Acoustic hood |
| 7210 | Ventilator | Fan |

*Drawing no.: 4000140410*



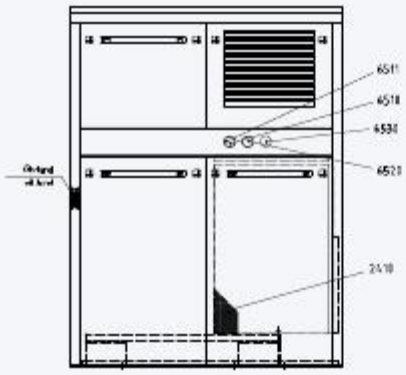



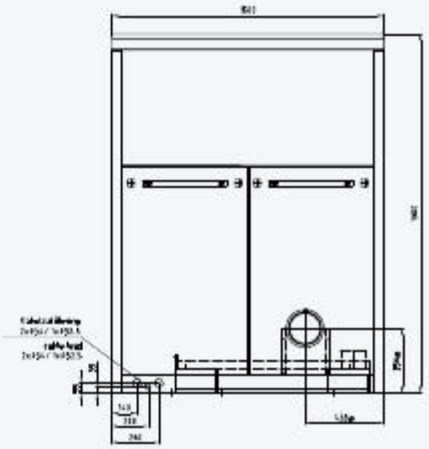



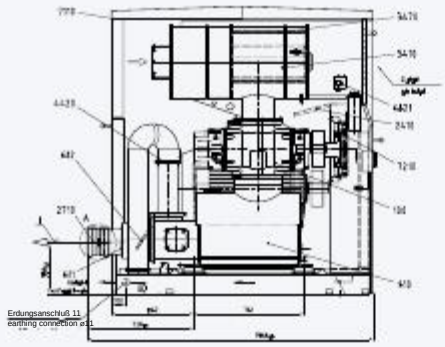

| Pos. | Benennung | Description |
|---|---|---|
| 100 | Gebläse | Blower |
| 610 | Grundträger | Base frame |
| 611 | Anschlussgehäuse | Connection housing |
| 612 | Rückschlagklappe | Check valve |
| 613 | Elastischer Maschinenfuß | Flexible machinery mounting |
| 620 | Motorwippe | Hinged motor mounting plate |
| 1810 | Motor | Motor |
| 2110 | Riementrieb | Belt drive |
| 2410 | Riemenschutz | Belt guard |
| 2710 | Elastische Rohrverbindung DS | Flexible pipe connection DS |
| 3410 | Filterschalldämpfer | Filter silencer |
| 3450 | Option: Elastische Rohrverbindung SS | Optional: flexible pipe connection SS |
| 3470 | Ansaugfilter | Inlet filter |
| 4420 | Druckventil | Pressure valve |
| 5310 | Option: Anfahrentlastung | Optional: start unloading device |
| 6510 | Wartungsanzeiger | Service indicator |
| 6520 | Manometer | Pressure gauge |
| 7210 | Ventilator | Fan |

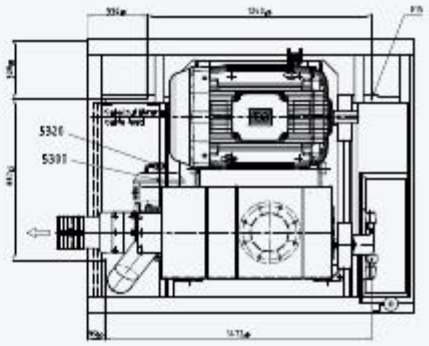
*Drawing no.: 4000157416*

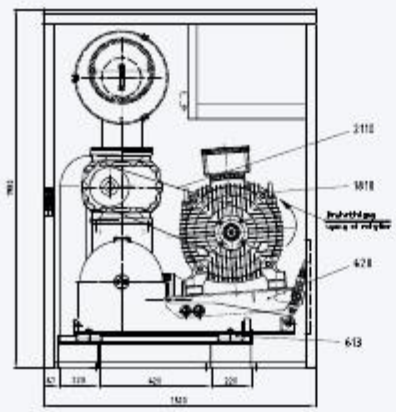
# DELTA BLOWER GM 30 L



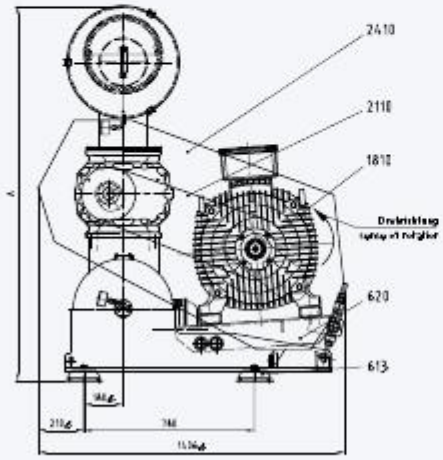


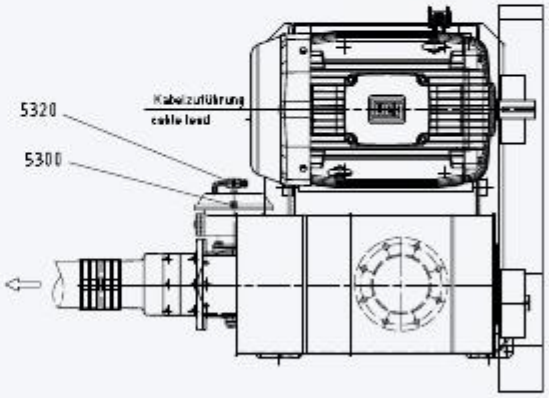



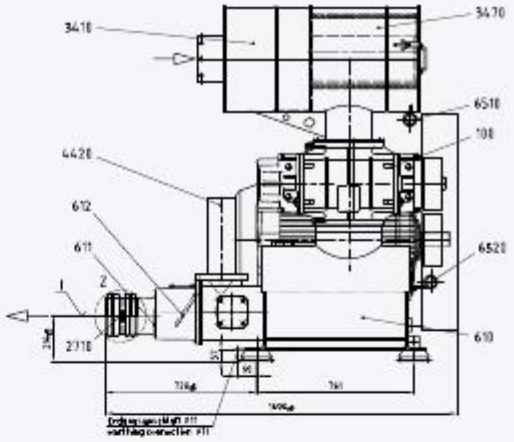




| Pos. | Benennung | Description |
|---|---|---|
| 100 | Gebläse | Blower |
| 610 | Grundträger | Base frame |
| 611 | Anschlussgehäuse | Connection housing |
| 612 | Rückschlagklappe | Check valve |
| 613 | Elastischer Maschinenfuß | Flexible machinery mounting |
| 620 | Motorwippe | Hinged motor mounting plate |
| 1810 | Motor | Motor |
| 2110 | Riementrieb | Belt drive |
| 2410 | Sonderzubehör: Riemenschutz | Extras: belt guard |
| 2710 | Elastische Rohrverbindung DS | Flexible pipe connection DS |
| 3410 | Filterschalldämpfer | Filter silencer |
| 3470 | Ansaugfilter | Inlet filter |
| 3450 | Option: Elastische Rohrverbindung SS | Optional: flexible pipe connection SS |
| 4420 | Druckventil | Pressure valve |
| 5310 | Sonderzubehör: Anfahrentlastung | Extras: start unloading device |
| 5320 | Sonderzubehör: Magnetventil | Extras: solenoid valve |
| 6510 | Wartungsanzeiger | Service indicator |
| 6511 | Sonderzubehör: Druckwächter SS | Extras: pressure switch SS |
| 6520 | Manometer | Pressure gauge |
| 6530 | Sonderzubehör: Druckschalter DS | Extras: pressure switch DS |
| 6521 | Sonderzubehör: Kontakt-Thermometer | Extras: contact thermometer |
| 7110 | Schallhaube | Acoustic hood |
| 7210 | Ventilator | Fan |

*Drawing no.: 4000148572*



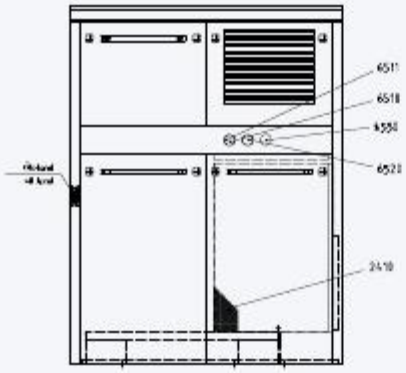



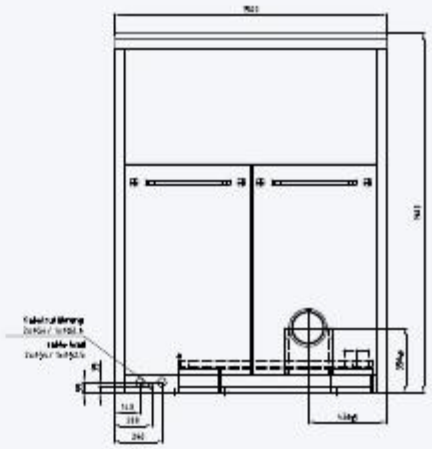



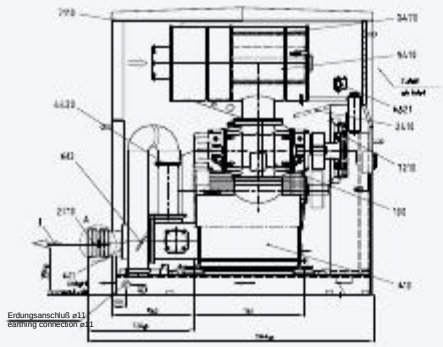

| Pos. | Benennung | Description |
|---|---|---|
| 100 | Gebläse | Blower |
| 610 | Grundträger | Base frame |
| 611 | Anschlussgehäuse | Connection housing |
| 612 | Rückschlagklappe | Check valve |
| 613 | Elastischer Maschinenfuß | Flexible machinery mounting |
| 620 | Motorwippe | Hinged motor mounting plate |
| 1810 | Motor | Motor |
| 2110 | Riementrieb | Belt drive |
| 2410 | Riemenschutz | Belt guard |
| 2710 | Elastische Rohrverbindung DS | Flexible pipe connection DS |
| 3410 | Filterschalldämpfer | Filter silencer |
| 3470 | Ansaugfilter | Inlet filter |
| 4420 | Druckventil | Pressure valve |
| 5310 | Sonderzubehör: Anfahrentlastung | Extras: start unloading device |
| 5320 | Sonderzubehör: Magnetventil | Extras: solenoid valve |
| 6510 | Wartungsanzeiger | Service indicator |
| 6520 | Manometer | Pressure gauge |

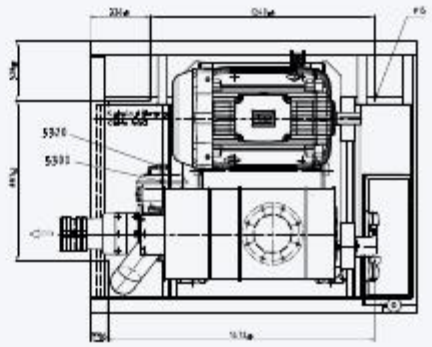
*Drawing no.: 4000148480*

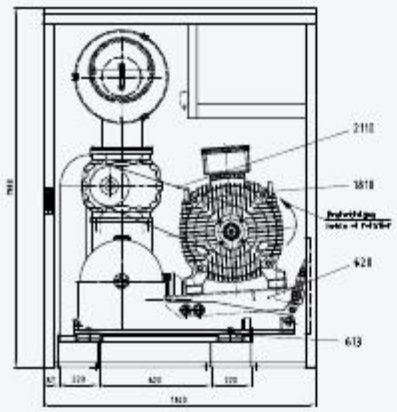
# DELTA BLOWER GM 35 S



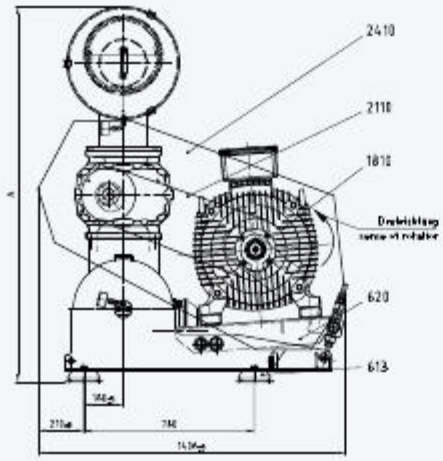


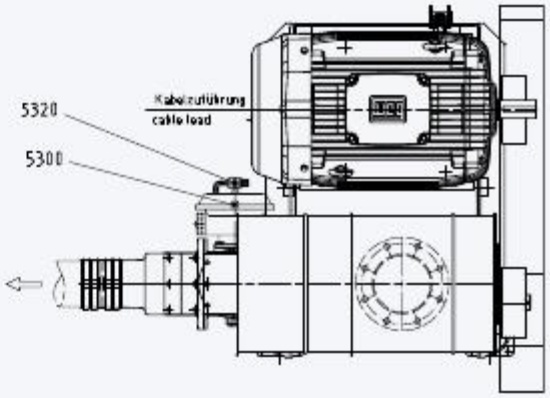



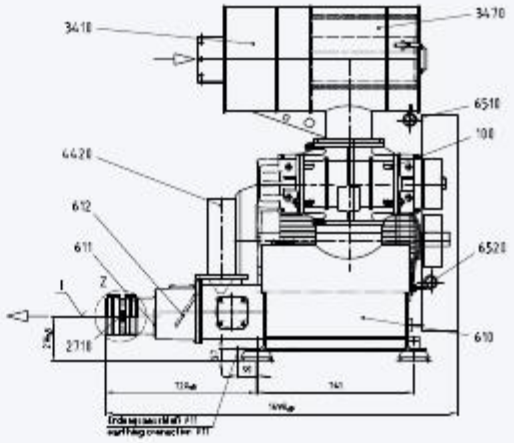




| Pos. | Benennung | Description |
|---|---|---|
| 100 | Gebläse | Blower |
| 610 | Grundträger | Base frame |
| 611 | Anschlussgehäuse | Connection housing |
| 612 | Rückschlagklappe | Check valve |
| 613 | Elastischer Maschinenfuß | Flexible machinery mounting |
| 620 | Motorwippe | Hinged motor mounting plate |
| 1810 | Motor | Motor |
| 2110 | Riementrieb | Belt drive |
| 2410 | Sonderzubehör: Riemenschutz | Extras: belt guard |
| 2710 | Elastische Rohrverbindung DS | Flexible pipe connection DS |
| 3410 | Filterschalldämpfer | Filter silencer |
| 3470 | Ansaugfilter | Inlet filter |
| 3450 | Option: Elastische Rohrverbindung SS | Optional: flexible pipe connection SS |
| 4420 | Druckventil | Pressure valve |
| 5310 | Sonderzubehör: Anfahrentlastung | Extras: start unloading device |
| 5320 | Sonderzubehör: Magnetventil | Extras: solenoid valve |
| 6510 | Wartungsanzeiger | Service indicator |
| 6511 | Sonderzubehör: Druckwächter SS | Extras: pressure switch SS |
| 6520 | Manometer | Pressure gauge |
| 6530 | Sonderzubehör: Druckschalter DS | Extras: pressure switch DS |
| 6521 | Sonderzubehör: Kontakt-Thermometer | Extras: contact thermometer |
| 7110 | Schallhaube | Acoustic hood |
| 7210 | Ventilator | Fan |

*Drawing no.: 4000148572*



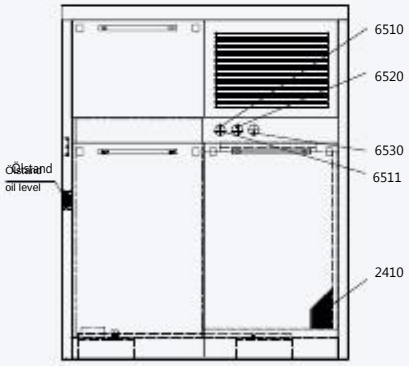



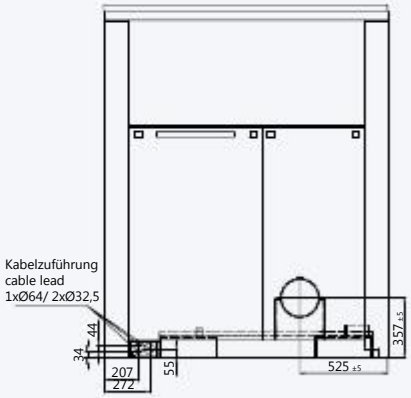



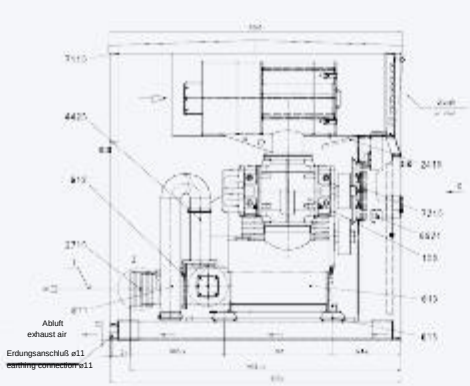

| Pos. | Benennung | Description |
|---|---|---|
| 100 | Gebläse | Blower |
| 610 | Grundträger | Base frame |
| 611 | Anschlussgehäuse | Connection housing |
| 612 | Rückschlagklappe | Check valve |
| 613 | Elastischer Maschinenfuß | Flexible machinery mounting |
| 620 | Motorwippe | Hinged motor mounting plate |
| 1810 | Motor | Motor |
| 2110 | Riementrieb | Belt drive |
| 2410 | Riemenschutz | Belt guard |
| 2710 | Elastische Rohrverbindung DS | Flexible pipe connection DS |
| 3410 | Filterschalldämpfer | Filter silencer |
| 3470 | Ansaugfilter | Inlet filter |
| 4420 | Druckventil | Pressure valve |
| 5310 | Sonderzubehör: Anfahrentlastung | Extras: start unloading device |
| 5320 | Sonderzubehör: Magnetventil | Extras: solenoid valve |
| 6510 | Wartungsanzeiger | Service indicator |
| 6520 | Manometer | Pressure gauge |

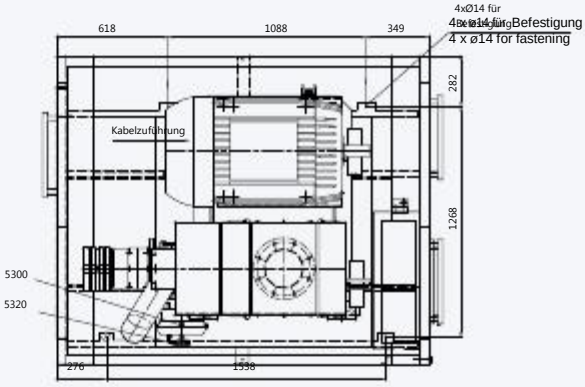
*Drawing no.: 4000148480*

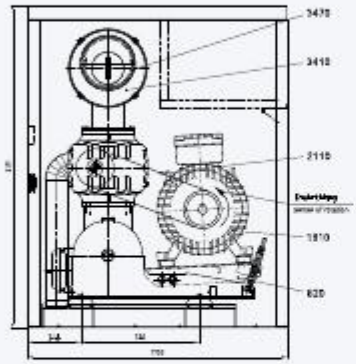
# DELTA BLOWER GM 50 L



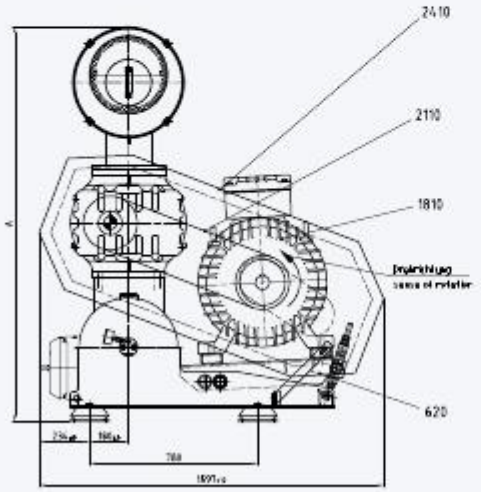



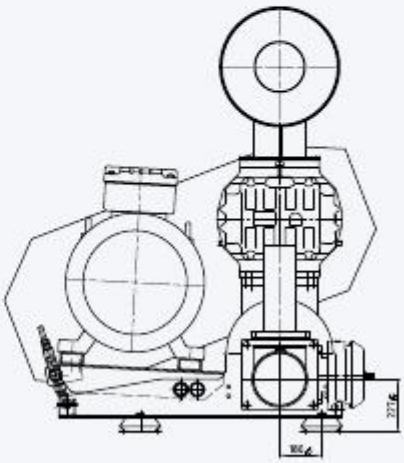



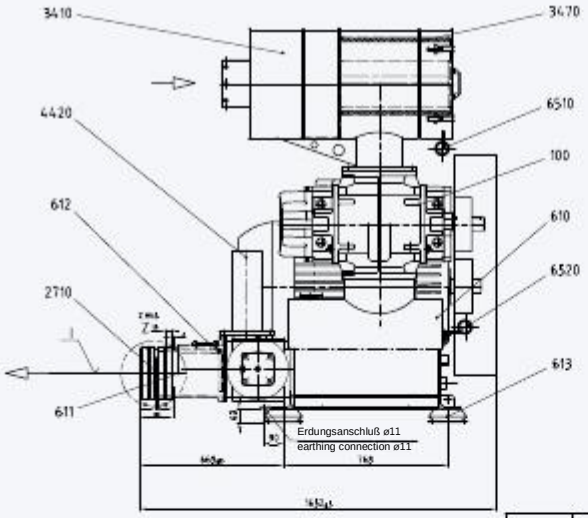



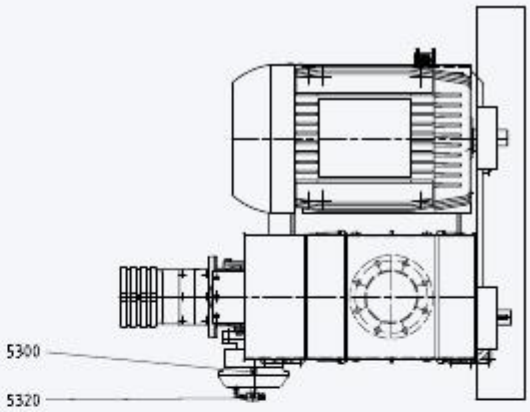
| Pos. | Benennung | Description |
|---|---|---|
| 100 | Gebläse | Blower |
| 610 | Grundträger | Base frame |
| 611 | Anschlussgehäuse | Connection housing |
| 612 | Rückschlagklappe | Check valve |
| 613 | Elastischer Maschinenfuß | Flexible machinery mounting |
| 620 | Motorwippe | Hinged motor mounting plate |
| 1810 | Motor | Motor |
| 2110 | Riementrieb | Belt drive |
| 2410 | Sonderzubehör: Riemenschutz | Extras: belt guard |
| 2710 | Elastische Rohrverbindung DS | Flexible pipe connection DS |
| 3410 | Filterschalldämpfer | Filter silencer |
| 3470 | Ansaugfilter | Inlet filter |
| 4420 | Druckventil | Pressure valve |
| 5310 | Sonderzubehör: Anfahrentlastung | Extras: start unloading device |
| 5320 | Sonderzubehör: Magnetventil | Extras: solenoid valve |
| 6510 | Wartungsanzeiger | Service indicator |
| 6511 | Sonderzubehör: Druckwächter SS | Extras: pressure switch SS |
| 6520 | Manometer | Pressure gauge |
| 6530 | Sonderzubehör: Druckschalter DS | Extras: pressure switch DS |
| 6521 | Sonderzubehör: Kontakt-Thermometer | Extras: contact thermometer |
| 7110 | Schallhaube | Acoustic hood |
| 7210 | Ventilator | Fan |

*Drawing no.: 4000146628*



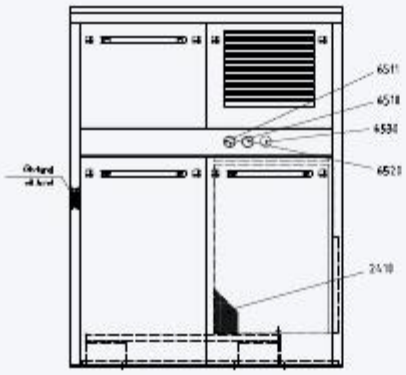


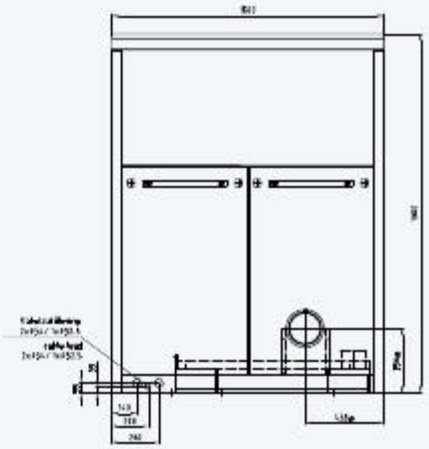



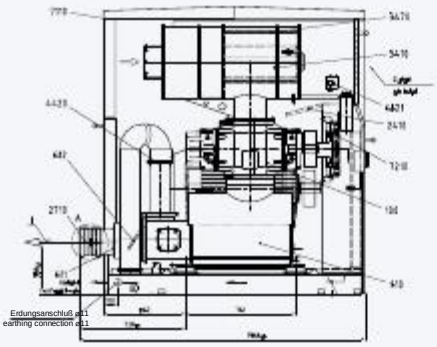

| Pos. | Benennung | Description |
|---|---|---|
| 100 | Gebläse | Blower |
| 610 | Grundträger | Base frame |
| 611 | Anschlussgehäuse | Connection housing |
| 612 | Rückschlagklappe | Check valve |
| 613 | Elastischer Maschinenfuß | Flexible machinery mounting |
| 620 | Motorwippe | Hinged motor mounting plate |
| 1810 | Motor | Motor |
| 2110 | Riementrieb | Belt drive |
| 2710 | Elastische Rohrverbindung DS | Flexible pipe connection DS |
| 3410 | Filterschalldämpfer | Filter silencer |
| 3470 | Ansaugfilter | Inlet filter |
| 4420 | Druckventil | Pressure valve |
| 5310 | Sonderzubehör: Anfahrentlastung | Extras: start unloading device |
| 5320 | Sonderzubehör: Magnetventil | Extras: solenoid valve |
| 6520 | Manometer | Pressure gauge |
| 6510 | Wartungsanzeiger | Service indicator |

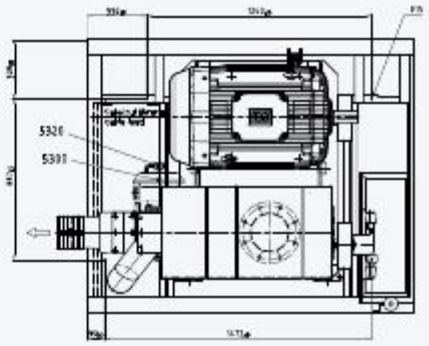
*Drawing no.: 4000144598*

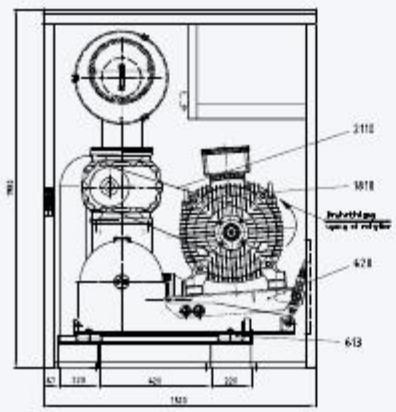
# DELTA BLOWER GM 50 L



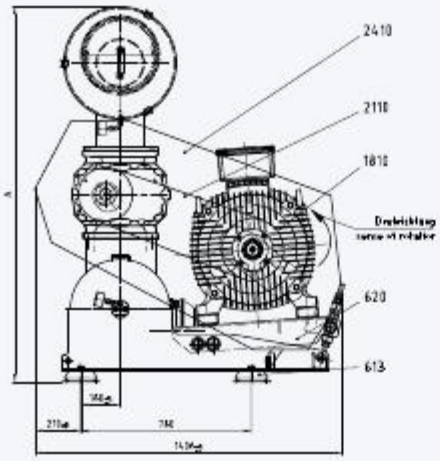


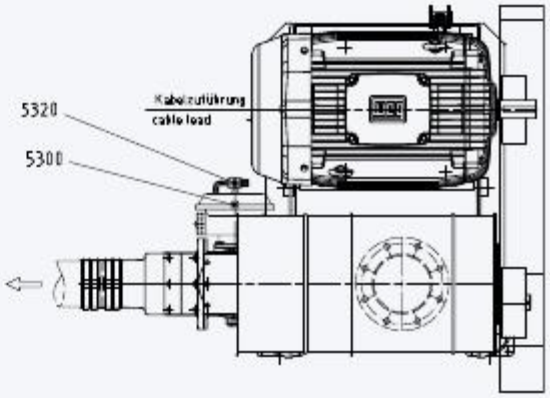



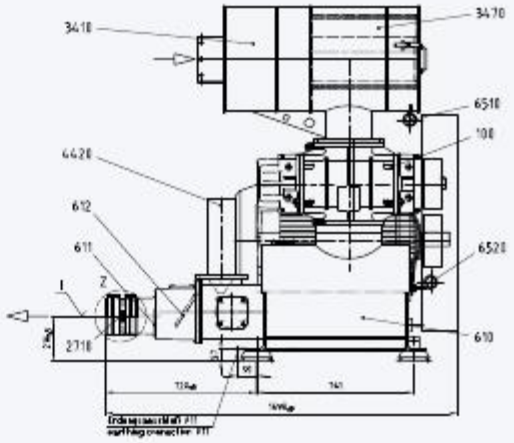




| Pos. | Benennung | Description |
|---|---|---|
| 100 | Gebläse | Blower |
| 610 | Grundträger | Base frame |
| 611 | Anschlussgehäuse | Connection housing |
| 612 | Rückschlagklappe | Check valve |
| 613 | Elastischer Maschinenfuß | Flexible machinery mounting |
| 620 | Motorwippe | Hinged motor mounting plate |
| 1810 | Motor | Motor |
| 2110 | Riementrieb | Belt drive |
| 2410 | Sonderzubehör: Riemenschutz | Extras: belt guard |
| 2710 | Elastische Rohrverbindung DS | Flexible pipe connection DS |
| 3410 | Filterschalldämpfer | Filter silencer |
| 3470 | Ansaugfilter | Inlet filter |
| 3450 | Option: Elastische Rohrverbindung SS | Optional: flexible pipe connection SS |
| 4420 | Druckventil | Pressure valve |
| 5310 | Sonderzubehör: Anfahrentlastung | Extras: start unloading device |
| 5320 | Sonderzubehör: Magnetventil | Extras: solenoid valve |
| 6510 | Wartungsanzeiger | Service indicator |
| 6511 | Sonderzubehör: Druckwächter SS | Extras: pressure switch SS |
| 6520 | Manometer | Pressure gauge |
| 6530 | Sonderzubehör: Druckschalter DS | Extras: pressure switch DS |
| 6521 | Sonderzubehör: Kontakt-Thermometer | Extras: contact thermometer |
| 7110 | Schallhaube | Acoustic hood |
| 7210 | Ventilator | Fan |

*Drawing no.: 4000148572*



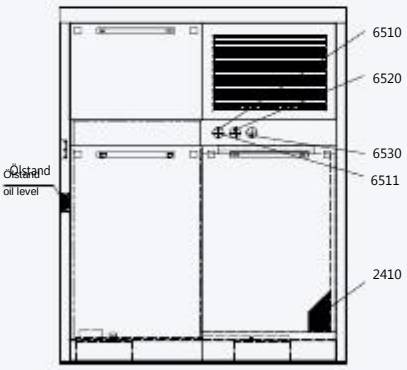



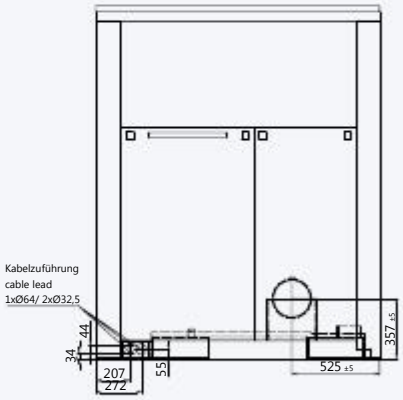



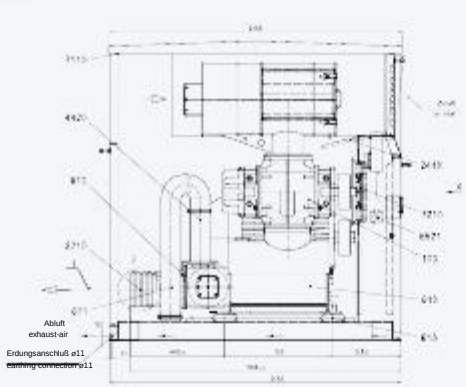

| Pos. | Benennung | Description |
|---|---|---|
| 100 | Gebläse | Blower |
| 610 | Grundträger | Base frame |
| 611 | Anschlussgehäuse | Connection housing |
| 612 | Rückschlagklappe | Check valve |
| 613 | Elastischer Maschinenfuß | Flexible machinery mounting |
| 620 | Motorwippe | Hinged motor mounting plate |
| 1810 | Motor | Motor |
| 2110 | Riementrieb | Belt drive |
| 2410 | Riemenschutz | Belt guard |
| 2710 | Elastische Rohrverbindung DS | Flexible pipe connection DS |
| 3410 | Filterschalldämpfer | Filter silencer |
| 3470 | Ansaugfilter | Inlet filter |
| 4420 | Druckventil | Pressure valve |
| 5310 | Sonderzubehör: Anfahrentlastung | Extras: start unloading device |
| 5320 | Sonderzubehör: Magnetventil | Extras: solenoid valve |
| 6510 | Wartungsanzeiger | Service indicator |
| 6520 | Manometer | Pressure gauge |

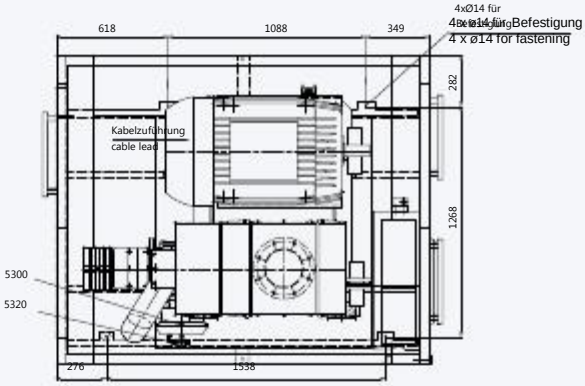
*Drawing no.: 4000148480*

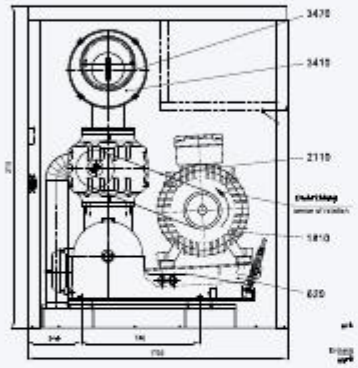
# DELTA BLOWER GM 60 S



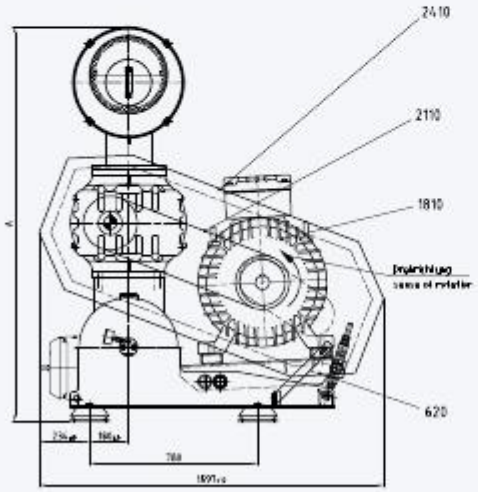



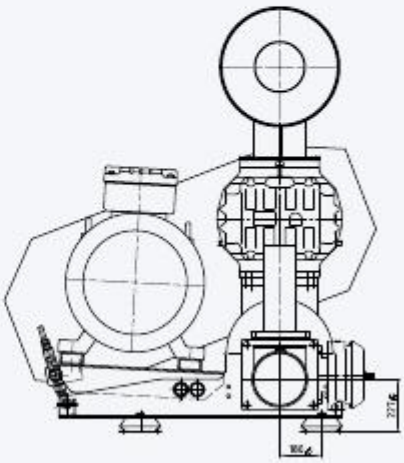



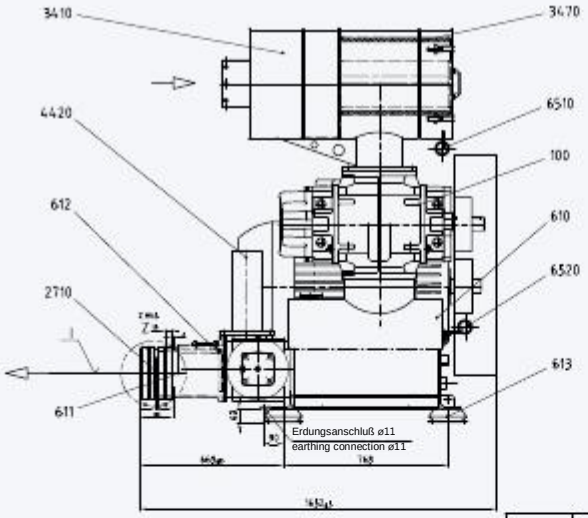



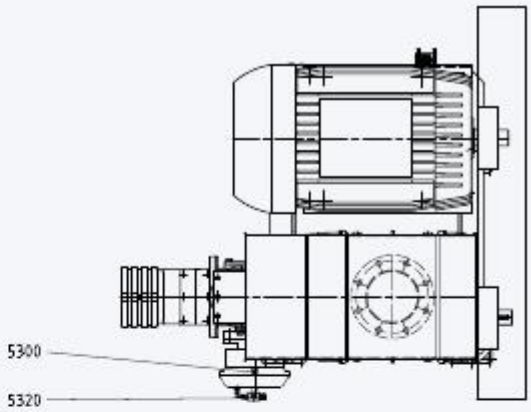

| Pos. | Benennung | Description |
|---|---|---|
| 100 | Gebläse | Blower |
| 610 | Grundträger | Base frame |
| 611 | Anschlussgehäuse | Connection housing |
| 612 | Rückschlagklappe | Check valve |
| 613 | Elastischer Maschinenfuß | Flexible machinery mounting |
| 620 | Motorwippe | Hinged motor mounting plate |
| 1810 | Motor | Motor |
| 2110 | Riementrieb | Belt drive |
| 2410 | Sonderzubehör: Riemenschutz | Extras: belt guard |
| 2710 | Elastische Rohrverbindung DS | Flexible pipe connection DS |
| 3410 | Filterschalldämpfer | Filter silencer |
| 3470 | Ansaugfilter | Inlet filter |
| 4420 | Druckventil | Pressure valve |
| 5310 | Sonderzubehör: Anfahrentlastung | Extras: start unloading device |
| 5320 | Sonderzubehör: Magnetventil | Extras: solenoid valve |
| 6510 | Wartungsanzeiger | Service indicator |
| 6511 | Sonderzubehör: Druckwächter SS | Extras: pressure monitor SS |
| 6520 | Manometer | Pressure gauge |
| 6530 | Sonderzubehör: Druckschalter DS | Extras: pressure switch DS |
| 6521 | Sonderzubehör: Kontakt-Thermometer | Extras: contact thermometer |
| 7110 | Schallhaube | Acoustic hood |
| 7210 | Ventilator | Fan |

*Drawing no.: 4000146628*



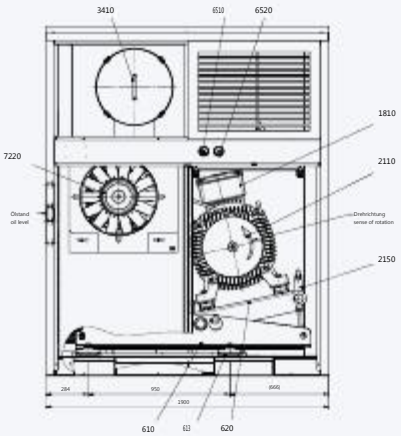


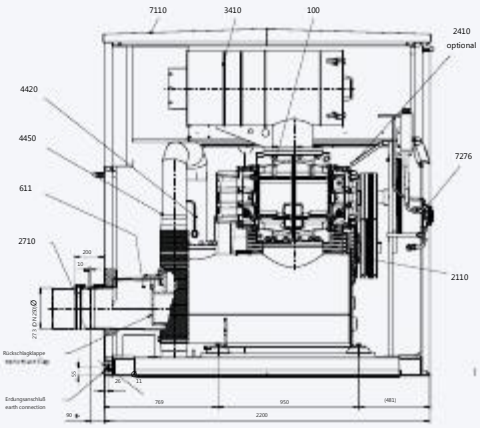



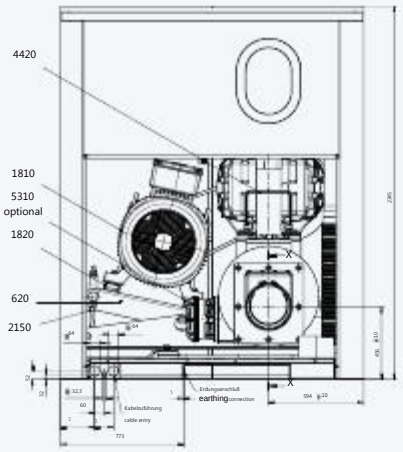

| Pos. | Benennung | Description |
|---|---|---|
| 100 | Gebläse | Blower |
| 610 | Grundträger | Base frame |
| 611 | Anschlussgehäuse | Connection housing |
| 612 | Rückschlagklappe | Check valve |
| 613 | Elastischer Maschinenfuß | Flexible machinery mounting |
| 620 | Motorwippe | Hinged motor mounting plate |
| 1810 | Motor | Motor |
| 2110 | Riementrieb | Belt drive |
| 2710 | Elastische Rohrverbindung DS | Flexible pipe connection DS |
| 3410 | Filterschalldämpfer | Filter silencer |
| 3470 | Ansaugfilter | Inlet filter |
| 4420 | Druckventil | Pressure valve |
| 5310 | Sonderzubehör: Anfahrentlastung | Extras: start unloading device |
| 5320 | Sonderzubehör: Magnetventil | Extras: solenoid valve |
| 6520 | Manometer | Pressure gauge |
| 6510 | Wartungsanzeiger | Service indicator |

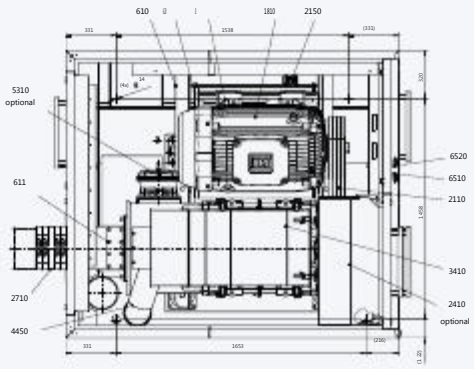
*Drawing no.: 4000144598*

# DELTA BLOWER GM 80 L



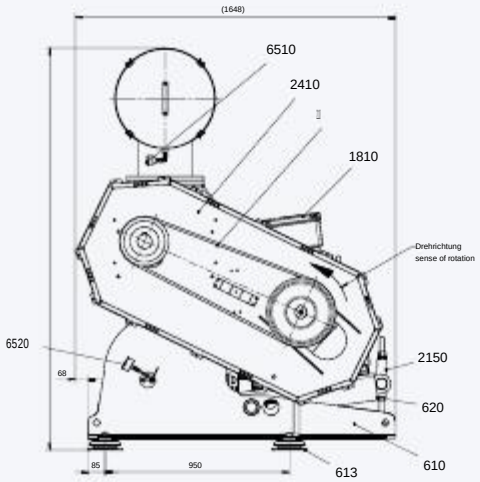



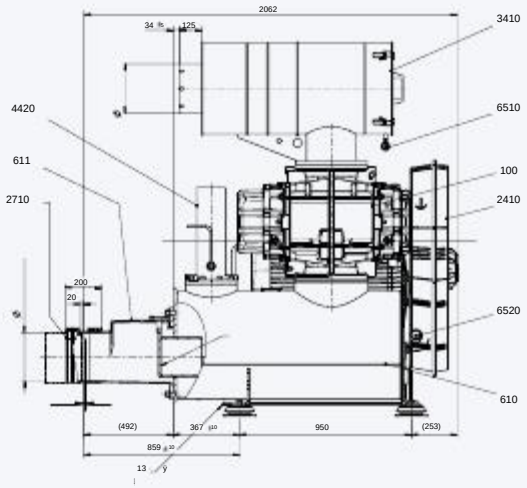



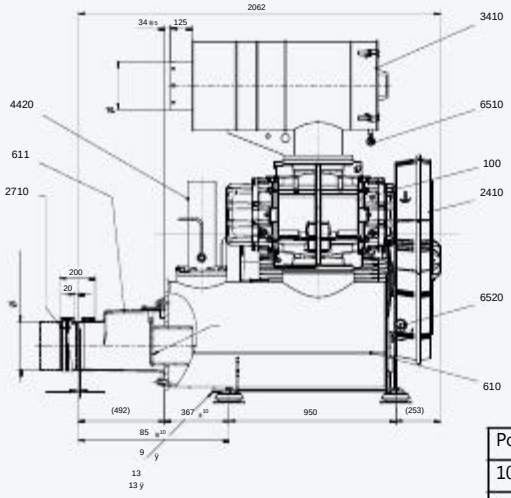



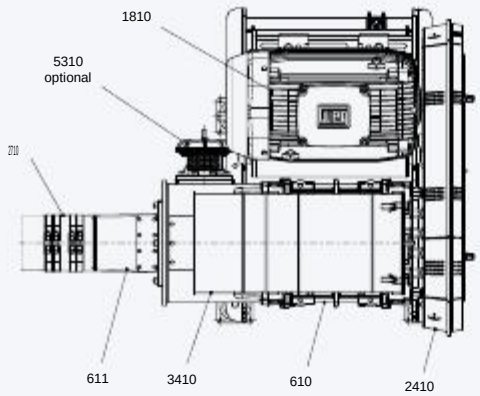

| Pos. | Benennung | Description |
|---|---|---|
| 100 | Gebläse | Blower |
| 610 | Grundträger | Base frame |
| 611 | Anschlussgehäuse mit Flansch | Connection housing with flange |
| 611 | Anschlussgehäuse | Connection housing |
| 613 | Elastischer Maschinenfuß | Flexible machinery mounting |
| 620 | Motorwippe | Hinged motor mounting plate |
| 1810 | Motor | Motor |
| 1820 | Motorbefestigung | Motor fastening |
| 2110 | Riementrieb | Belt drive |
| 2150 | Hebevorrichtung | Lifting device |
| 2410 | Optional: Riemenschutz | Extras: belt guard |
| 2710 | Elastische Rohrverbindung DS + Muffe | Flexible pipe connection DS + sleeve |
| 2710 | Elastische Rohrverbindung DS + Kompensator | Flexible pipe connection DS + compensator |
| 3410 | Filterschalldämpfer | Filter silencer |
| 4420 | Druckventil | Pressure valve |
| 5310 | Anfahrentlastung | Start unloading device |
| 6510 | Wartungsanzeiger | Service indicator |
| 6520 | Manometer | Pressure gauge |
| 7110 | Schallhaube | Acoustic hood |
| 7210 | Ventilator | Fan |
| 7276 | Ölstandanzeiger | Oil level indicator |

*Drawing no.: 4000165787*



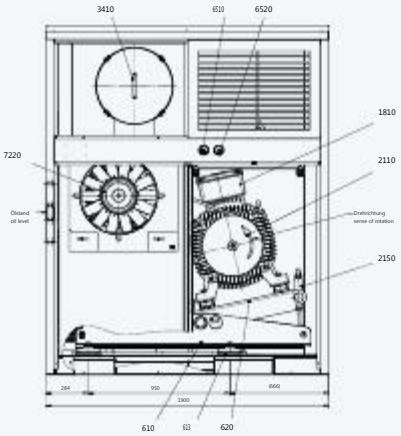



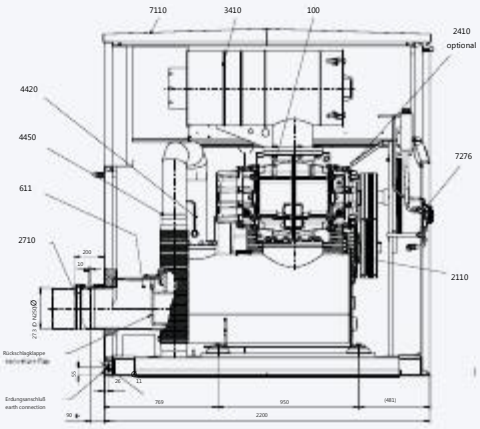



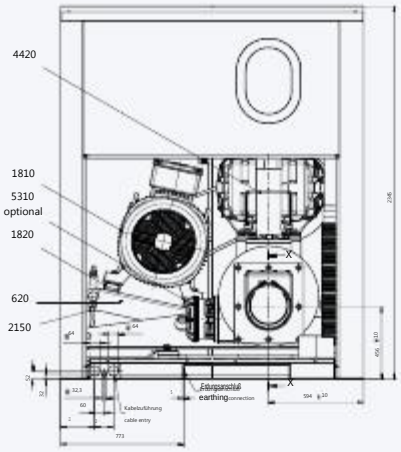

| Pos. | Benennung | Description |
|---|---|---|
| 100 | Gebläse | Blower |
| 610 | Grundträger | Base frame |
| 611 | Anschlussgehäuse mit Muffe | Connection housing for sleeve |
| 611 | Anschlussgehäuse mit Flansch | Connection housing with flange |
| 613 | Elastischer Maschinenfuß | Flexible machinery mounting |
| 620 | Motorwippe | Hinged motor mounting plate |
| 1810 | Motor | Motor |
| 1820 | Motorbefestigung | Motor fastening |
| 2110 | Riementrieb | Belt drive |
| 2150 | Hebevorrichtung | Lifting device |
| 2410 | Riemenschutz | belt guard |
| 2710 | Elastische Rohrverbindung DS + Muffe | Flexible pipe connection DS + sleeve |
| 2710 | Elastische Rohrverbindung DS + Kompensator | Flexible pipe connection DS + compensator |
| 3410 | Filterschalldämpfer | Filter silencer |
| 3450 | Elastischer Rohranschluss SS | Flexible pipe connection SS |
| 4420 | Ventil | Valve |
| 5310 | Anfahrentlastung | Start unloading device |
| 6510 | Wartungsanzeiger | Service indicator |
| 6520 | Manometer | Pressure gauge |

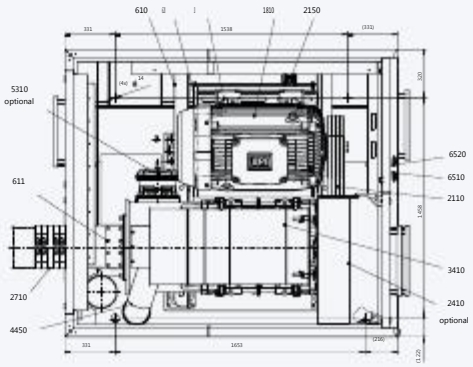
*Drawing no.: 4000096477*

# DELTA BLOWER GM 90 S



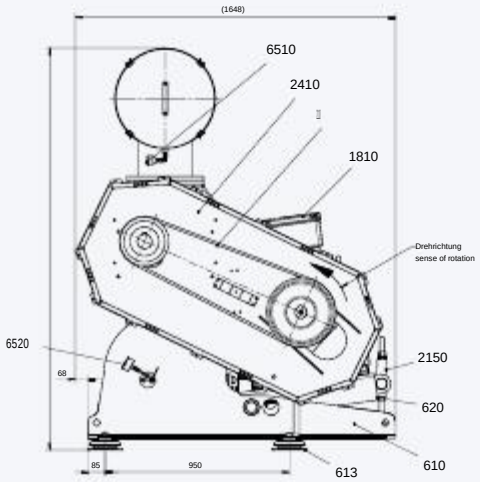



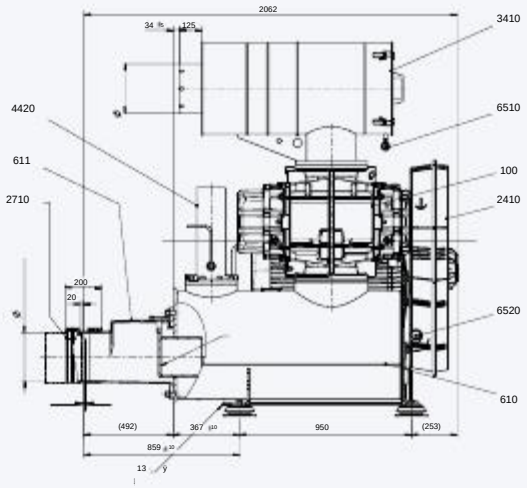



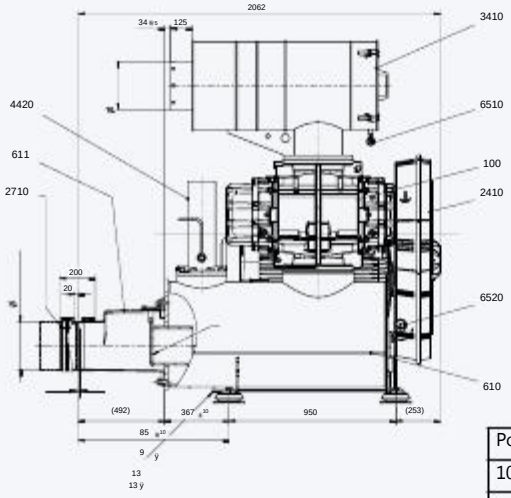



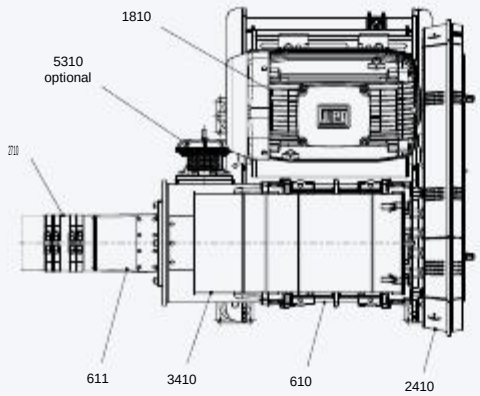

| Pos. | Benennung | Description |
|---|---|---|
| 100 | Gebläse | Blower |
| 610 | Grundträger | Base frame |
| 611 | Anschlussgehäuse mit Flansch | Connection housing with flange |
| 611 | Anschlussgehäuse | Connection housing |
| 613 | Elastischer Maschinenfuß | Flexible machinery mounting |
| 620 | Motorwippe | Hinged motor mounting plate |
| 1810 | Motor | Motor |
| 1820 | Motorbefestigung | Motor fastening |
| 2110 | Riementrieb | Belt drive |
| 2150 | Hebevorrichtung | Lifting device |
| 2410 | Optional: Riemenschutz | Extras: belt guard |
| 2710 | Elastische Rohrverbindung DS + Muffe | Flexible pipe connection DS + sleeve |
| 2710 | Elastische Rohrverbindung DS + Kompensator | Flexible pipe connection DS + compensator |
| 3410 | Filterschalldämpfer | Filter silencer |
| 4420 | Druckventil | Pressure valve |
| 5310 | Anfahrentlastung | Start unloading device |
| 6510 | Wartungsanzeiger | Service indicator |
| 6520 | Manometer | Pressure gauge |
| 7110 | Schallhaube | Acoustic hood |
| 7210 | Ventilator | Fan |
| 7276 | Ölstandanzeiger | Oil level indicator |

*Drawing no.: 4000165787*



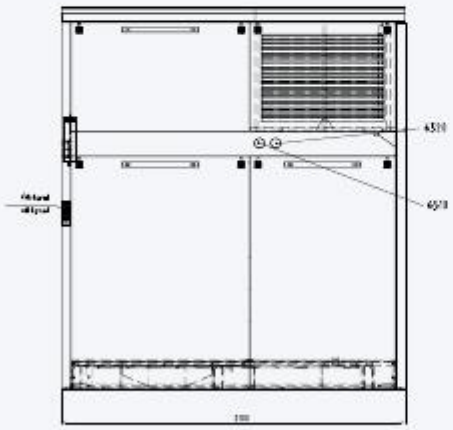



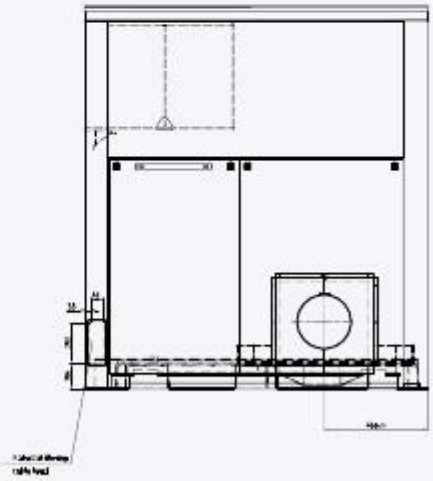



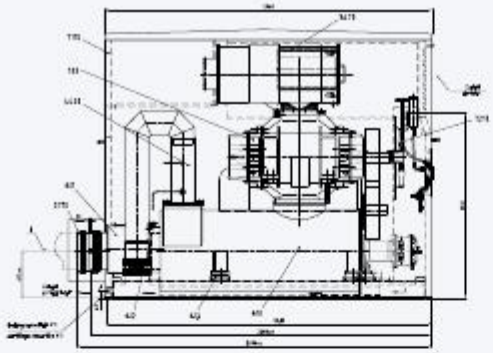

| Pos. | Benennung | Description |
|---|---|---|
| 100 | Gebläse | Blower |
| 610 | Grundträger | Base frame |
| 611 | Anschlussgehäuse mit Muffe | Connection housing with sleeve |
| 611 | Anschlussgehäuse mit Flansch | Connection housing with flange |
| 613 | Elastischer Maschinenfuß | Flexible machinery mounting |
| 620 | Motorwippe | Hinged motor mounting plate |
| 1810 | Motor | Motor |
| 1820 | Motorbefestigung | Motor fastening |
| 2110 | Riementrieb | Belt drive |
| 2150 | Hebevorrichtung | Lifting device |
| 2410 | Riemenschutz | belt guard |
| 2710 | Elastische Rohrverbindung DS + Muffe | Flexible pipe connection DS + sleeve |
| 2710 | Elastische Rohrverbindung DS + Kompensator | Flexible pipe connection DS + compensator |
| 3410 | Filterschalldämpfer | Filter silencer |
| 3450 | Elastischer Rohranschluss SS | Flexible pipe connection SS |
| 4420 | Ventil | Valve |
| 5310 | Anfahrentlastung | Start unloading device |
| 6510 | Wartungsanzeiger | Service indicator |
| 6520 | Manometer | Pressure gauge |

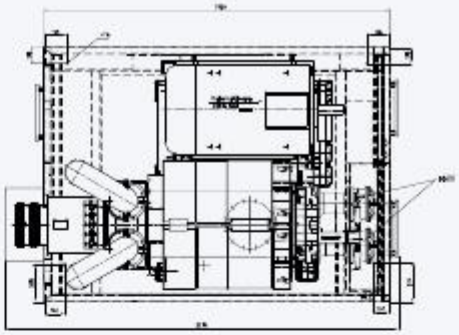
*Drawing no.: 4000096477*

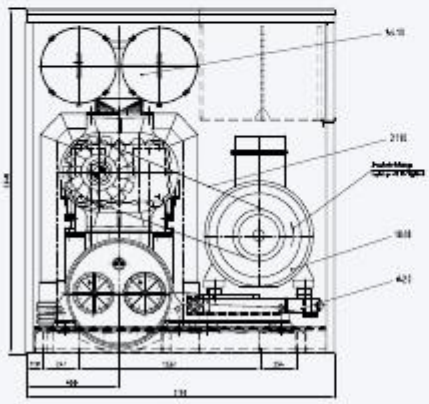
# DELTA BLOWER GM 130 L





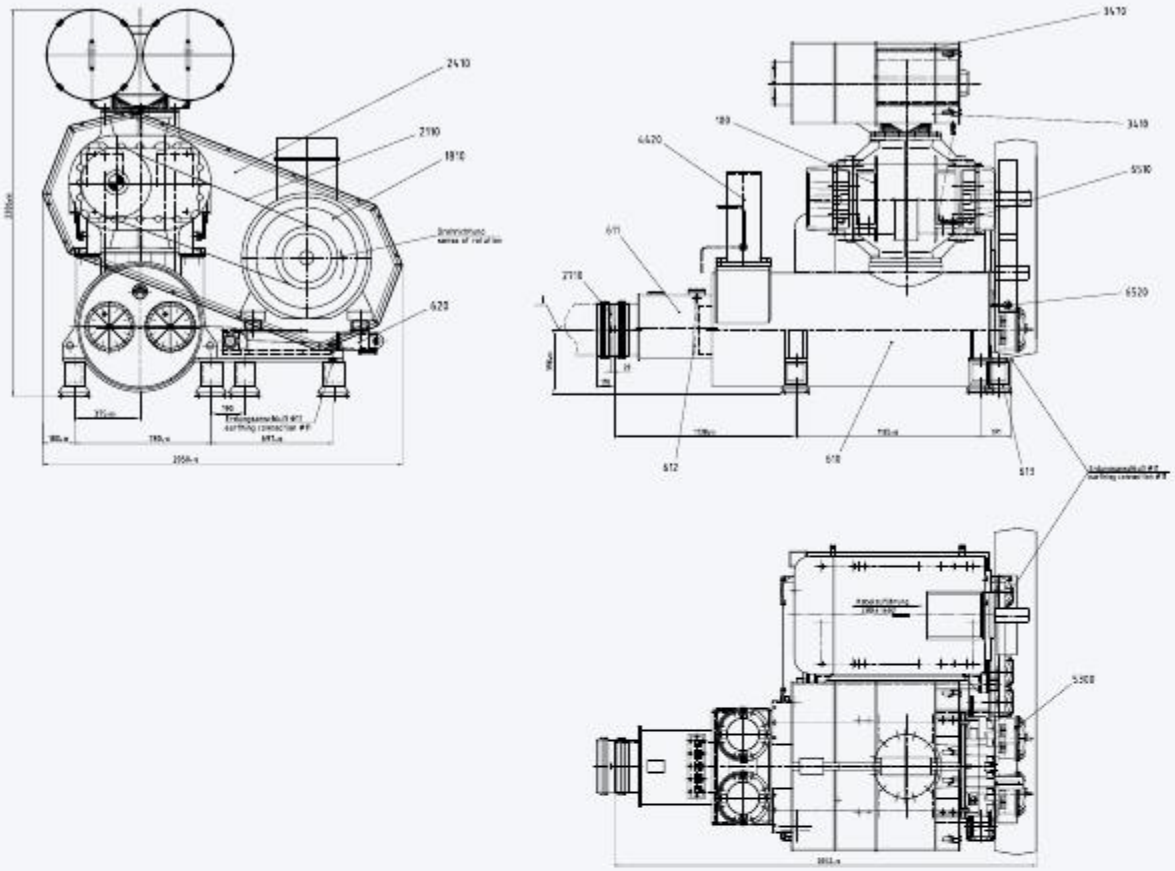






| Pos. | Benennung | Description |
|---|---|---|
| 100 | Gebläse | Blower |
| 610 | Grundträger | Base frame |
| 611 | Anschlussgehäuse | Connection housing |
| 612 | Rückschlagklappe | Check valve |
| 613 | Elastischer Maschinenfuß | Flexible machinery mounting |
| 620 | Motorwippe | Hinged motor mounting plate |
| 1810 | Motor | Motor |
| 2110 | Riementrieb | Belt drive |
| 2710 | Elastische Rohrverbindung DS | Flexible pipe connection DS |
| 3410 | Filterschalldämpfer | Filter silencer |
| 3470 | Ansaugfilter | Inlet filter |
| 4420 | Druckventil | Pressure valve |
| 5310 | Sonderzubehör: Anfahrentlastung | Extras: start unloading device |
| 6510 | Wartungsanzeiger | Service indicator |
| 6520 | Manometer | Pressure gauge |
| 7110 | Schallhaube | Acoustic hood |
| 7210 | Ventilator | Fan |

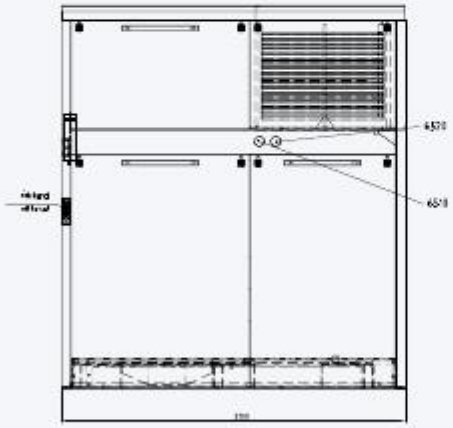
*Drawing no.: 4900105335*

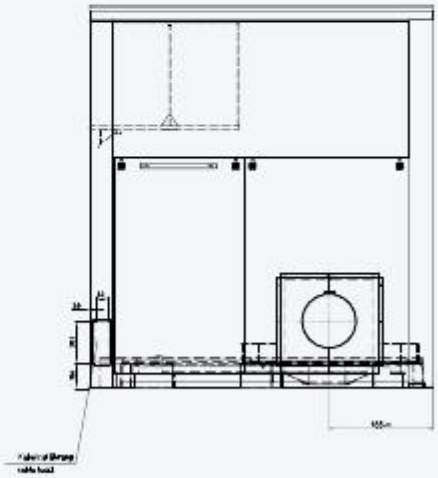


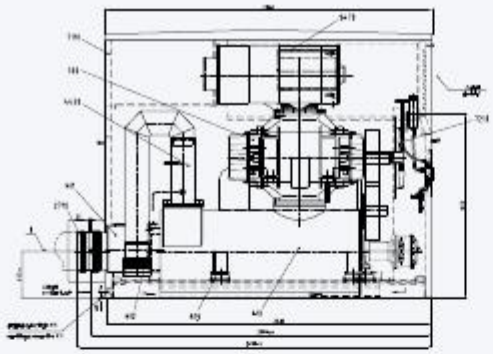
| Pos. | Benennung | Description |
|---|---|---|
| 100 | Gebläse | Blower |
| 610 | Grundträger | Base frame |
| 611 | Anschlussgehäuse | Connection housing |
| 612 | Rückschlagklappe | Check valve |
| 613 | Elastischer Maschinenfuß | Flexible machinery mounting |
| 1810 | Motor | Motor |
| 2110 | Riementrieb | Belt drive |
| 2410 | Riemenschutz | Belt guard |
| 2710 | Elastische Rohrverbindung DS | Flexible pipe connection DS |
| 3410 | Filterschalldämpfer | Filter silencer |
| 3470 | Ansaugfilter | Inlet filter |
| 4420 | Druckventil | Pressure valve |
| 5310 | Sonderzubehör: Anfahrentlastung | Extras: start unloading device |
| 6510 | Wartungsanzeiger | Service indicator |
| 6520 | Manometer | Pressure gauge |

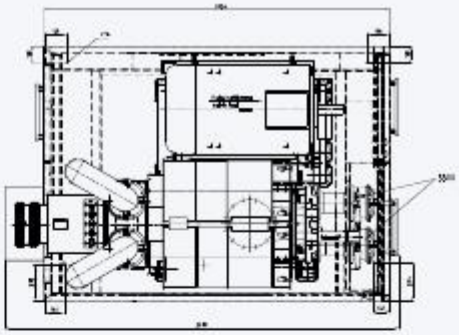
*Drawing no.: ZG-02414*

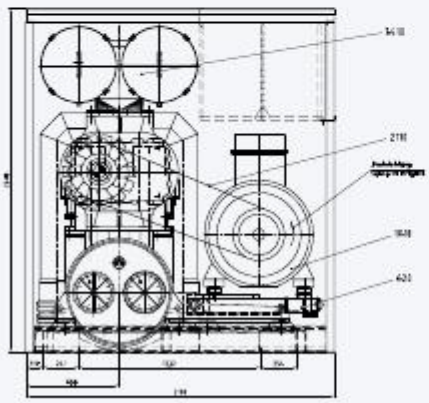
# DELTA BLOWER GM 150 S





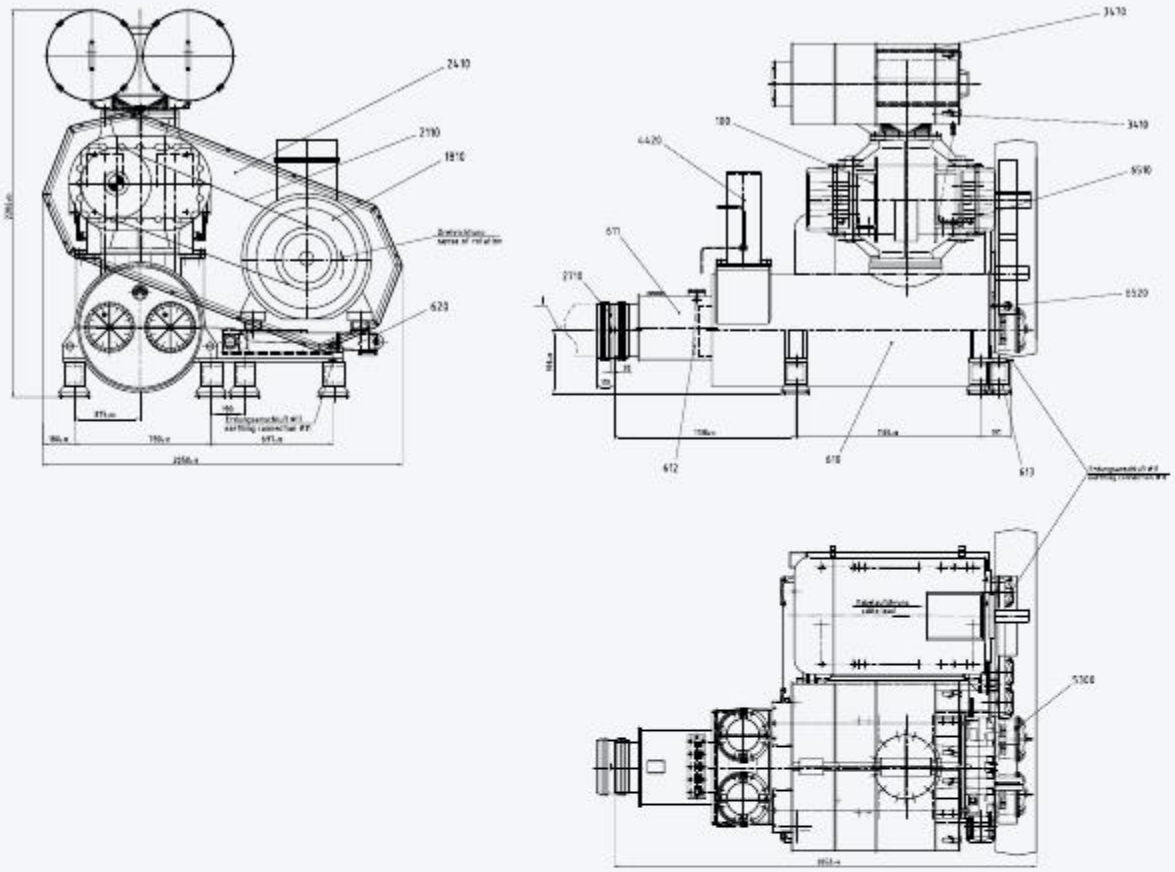






| Pos. | Benennung | Description |
|---|---|---|
| 100 | Gebläse | Blower |
| 610 | Grundträger | Base frame |
| 611 | Anschlussgehäuse | Connection housing |
| 612 | Rückschlagklappe | Check valve |
| 613 | Elastischer Maschinenfuß | Flexible machinery mounting |
| 620 | Motorwippe | Hinged motor mounting plate |
| 1810 | Motor | Motor |
| 2110 | Riementrieb | Belt drive |
| 2710 | Elastische Rohrverbindung DS | Flexible pipe connection DS |
| 3410 | Filterschalldämpfer | Filter silencer |
| 3470 | Ansaugfilter | Inlet filter |
| 4420 | Druckventil | Pressure valve |
| 5310 | Sonderzubehör: Anfahrentlastung | Extras: start unloading device |
| 6510 | Wartungsanzeiger | Service indicator |
| 6520 | Manometer | Pressure gauge |
| 7110 | Schallhaube | Acoustic hood |
| 7210 | Ventilator | Fan |

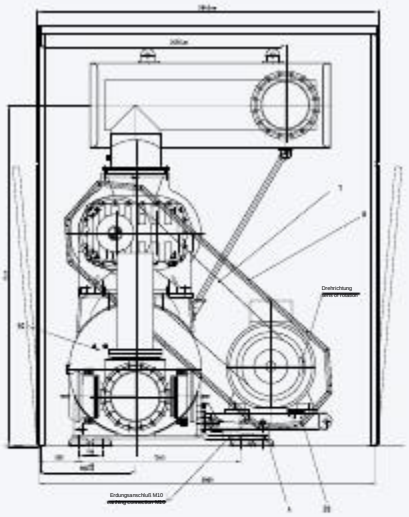
*Drawing no.: 4900105335*

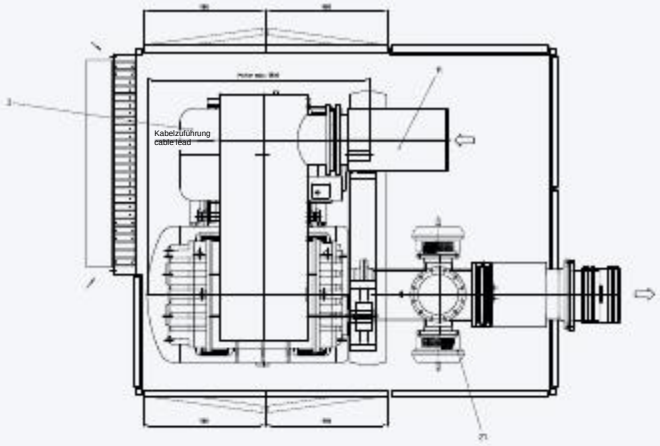


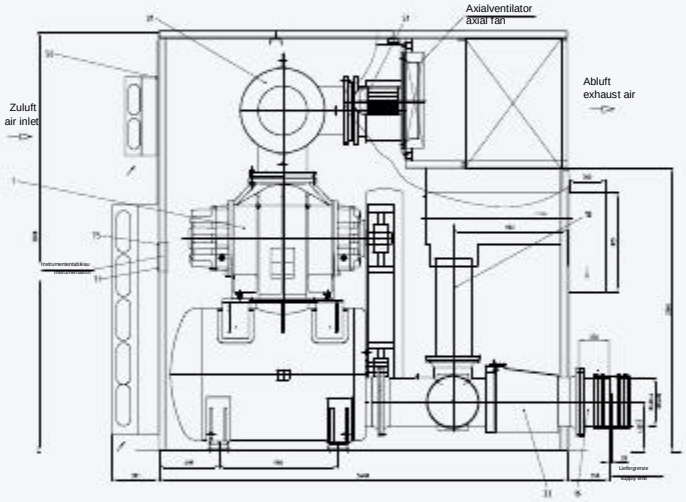

| Pos. | Benennung | Description |
|---|---|---|
| 100 | Gebläse | Blower |
| 610 | Grundträger | Base frame |
| 611 | Anschlussgehäuse | Connection housing |
| 612 | Rückschlagklappe | Check valve |
| 613 | Elastischer Maschinenfuß | Flexible machinery mounting |
| 1810 | Motor | Motor |
| 2110 | Riementrieb | Belt drive |
| 2410 | Riemenschutz | Belt guard |
| 2710 | Elastische Rohrverbindung DS | Flexible pipe connection DS |
| 3410 | Filterschalldämpfer | Filter silencer |
| 3470 | Ansaugfilter | Inlet filter |
| 4420 | Druckventil | Pressure valve |
| 5310 | Sonderzubehör: Anfahrentlastung | Extras: start unloading device |
| 6510 | Wartungsanzeiger | Service indicator |
| 6520 | Manometer | Pressure gauge |

*Drawing no.: ZG-02414*

# DELTA BLOWER GM 220 L

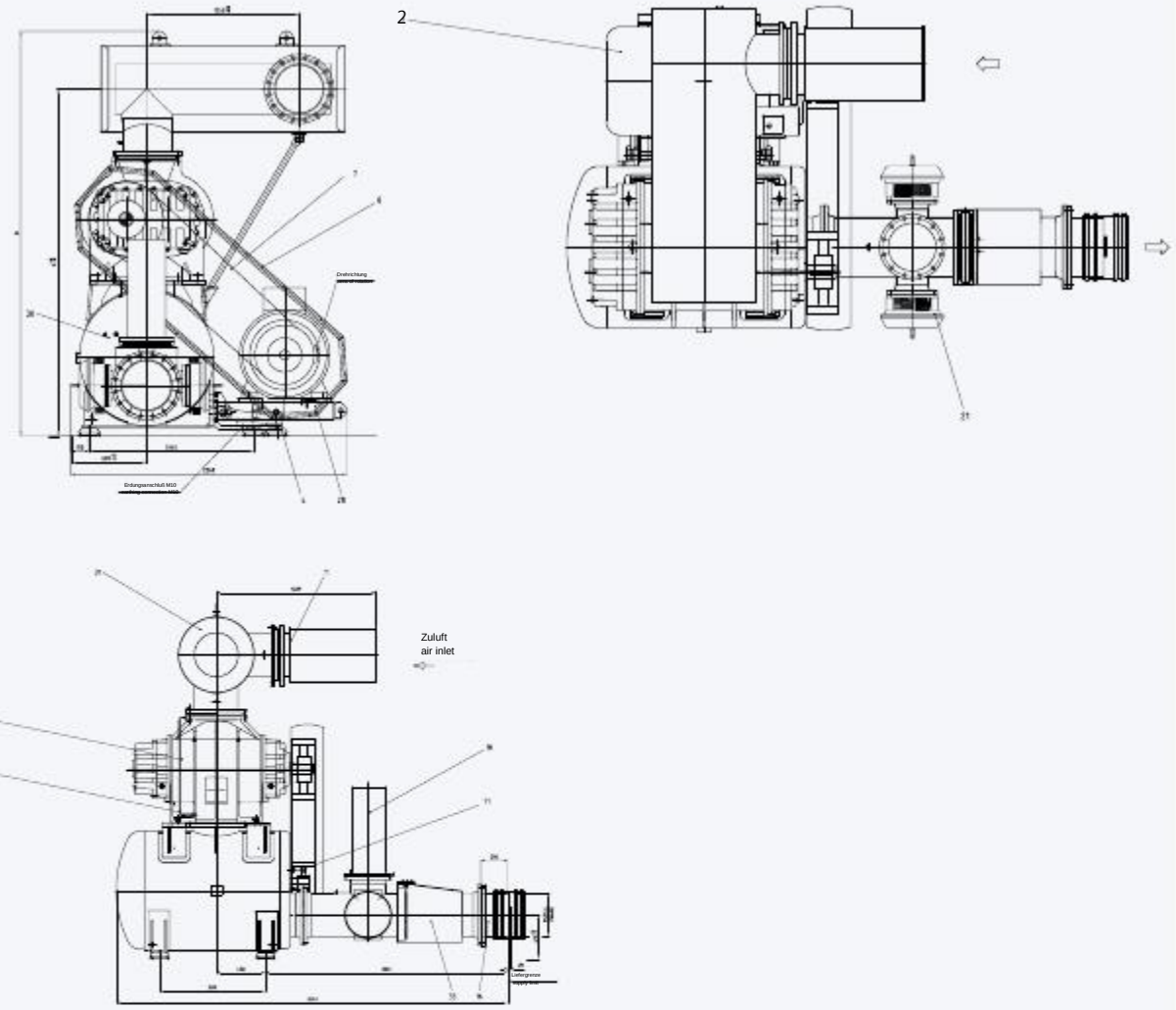





| Pos. | Benennung | Description |
|---|---|---|
| 1 | Gebläse | Blower |
| 2 | Motor | Motor |
| 4 | Elastischer Maschinenfuß | Flexible machinery mounting |
| 7 | Riementrieb | Belt drive |
| 8 | Riemenschutz | Belt guard |
| 16 | Elastische Rohrverbindung DS | Flexible pipe connection DS |
| 18 | Druckventil | Pressure valve |
| 28 | Motorwippe | Hinged motor mounting plate |
| 30 | Grundträger | Base frame |
| 31 | Saugschalldämpfer | Suction silencer |
| 33 | Anschlussgehäuse | Connection housing |
| 50 | Schallhaube | Acoustic hood |
| 51 | Ventilator | Fan |
| 21 | Sonderzubehör: Anfahrentlastung | Extras: start unloading device |
| 56 | Sonderzubehör: Regendach | Extras: shelter |
| 71 | Sonderzubehör: Manometer | Extras: pressure gauge |
| 75 | Sonderzubehör: Wartungsanzeiger | Extras: service indicator |

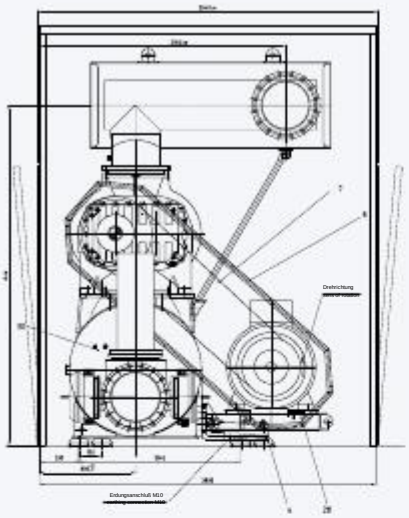
*Drawing no.: 0ZG-852*

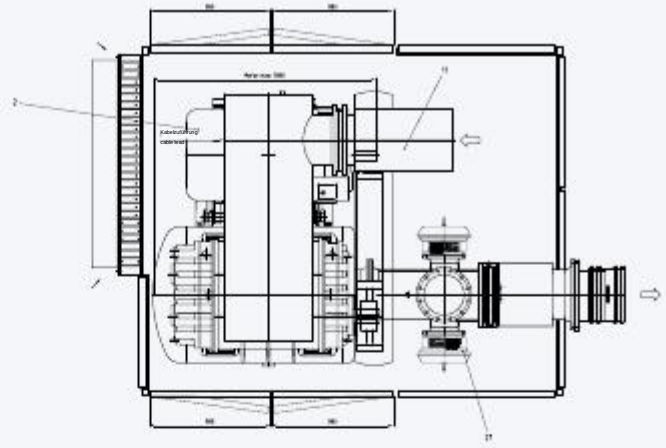


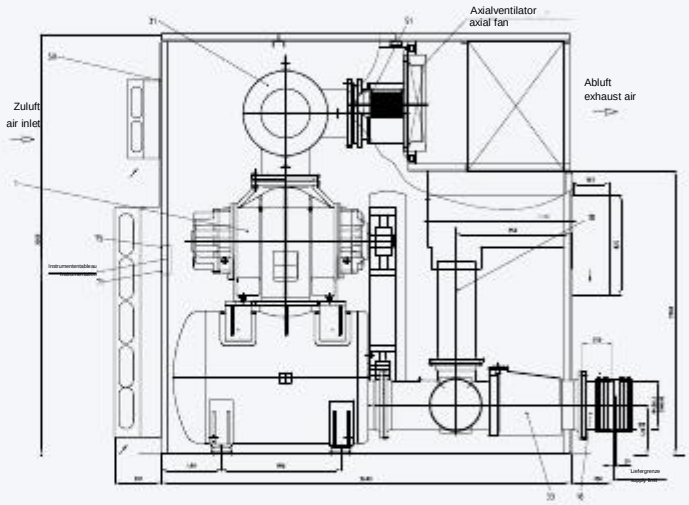

| Pos. | Benennung | Description |
|---|---|---|
| 1 | Gebläse | Blower |
| 2 | Motor | Motor |
| 4 | Elastischer Maschinenfuß | Flexible machinery mounting |
| 7 | Riementrieb | Belt drive |
| 8 | Riemenschutz | Belt guard |
| 11 | Ansaugfilter | Inlet filter |
| 16 | Elastische Rohrverbindung DS | Flexible pipe connection DS |
| 18 | Druckventil | Pressure valve |
| 28 | Motorwippe | Hinged motor mounting plate |
| 30 | Grundträger | Base frame |
| 31 | Saugschalldämpfer | Suction silencer |
| 33 | Anschlussgehäuse mit integr. Rückschlag-klappe | Connection housing with integr. check valve |
| 21 | Sonderzubehör: Anfahrentlastung | Extras: start unloading device |
| 71 | Sonderzubehör: Manometer | Extras: pressure gauge |
| 75 | Sonderzubehör: Wartungsanzeiger | Extras: service indicator |

*Drawing no.: 0ZG-851*

# DELTA BLOWER GM 240 S

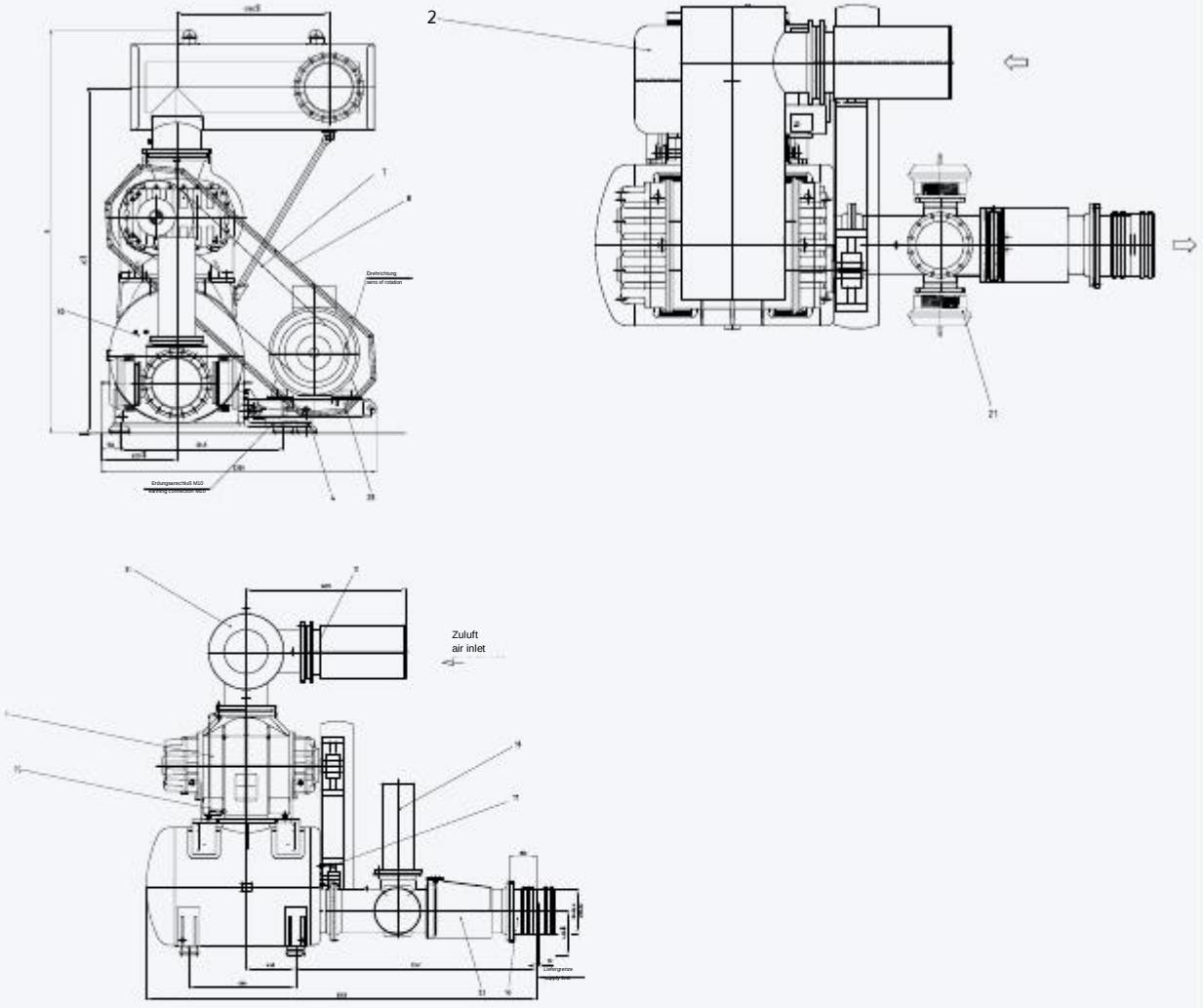







| Pos. | Benennung | Description |
|---|---|---|
| 1 | Gebläse | Blower |
| 2 | Motor | Motor |
| 4 | Elastischer Maschinenfuß | Flexible machinery mounting |
| 7 | Riementrieb | Belt drive |
| 8 | Riemenschutz | Belt guard |
| 16 | Elastische Rohrverbindung DS | Flexible pipe connection DS |
| 18 | Druckventil | Pressure valve |
| 28 | Motorwippe | Hinged motor mounting plate |
| 30 | Grundträger | Base frame |
| 31 | Saugschalldämpfer | Suction silencer |
| 33 | Anschlussgehäuse | Connection housing |
| 50 | Schallhaube | Acoustic hood |
| 51 | Ventilator | Fan |
| 21 | Sonderzubehör: Anfahrentlastung | Extras: start unloading device |
| 56 | Sonderzubehör: Regendach | Extras: shelter |
| 71 | Sonderzubehör: Manometer | Extras: pressure gauge |
| 75 | Sonderzubehör: Wartungsanzeiger | Extras: service indicator |

*Drawing no.: 0ZG-852*




| Pos. | Benennung | Description |
|---|---|---|
| 1 | Gebläse | Blower |
| 2 | Motor | Motor |
| 4 | Elastischer Maschinenfuß | Flexible machinery mounting |
| 7 | Riementrieb | Belt drive |
| 8 | Riemenschutz | Belt guard |
| 11 | Ansaugfilter | Inlet filter |
| 16 | Elastische Rohrverbindung DS | Flexible pipe connection DS |
| 18 | Druckventil | Pressure valve |
| 28 | Motorwippe | Hinged motor mounting plate |
| 30 | Grundträger | Base frame |
| 31 | Saugschalldämpfer | Suction silencer |
| 33 | Anschlussgehäuse mit integr. Rückschlag-klappe | Connection housing with integr. check valve |
| 21 | Sonderzubehör: Anfahrentlastung | Extras: start unloading device |
| 71 | Sonderzubehör: Manometer | Extras: pressure gauge |
| 75 | Sonderzubehör: Wartungsanzeiger | Extras: service indicator |

*Drawing no.: 0ZG-851*

# **ROTARY LOBE COMPRESSOR.**
# DELTA HyBRID.

The unique competence from the two worlds of the positive displacement blower and screw compressor was the basis for developing the new and ground-breaking future technology Delta Hybrid - the world's first range of rotary lobe compressors!

Delta Hybrid is a synergy of blower and compressor technology and offers completely new opportunities in the generation of negative and positive pressure of air and neutral gasses due to the constructive amalgamation of the advantages of both systems.
A total of 7 patents or patent applications mean that the Delta Hybrid is one of the most innovative products when it comes to compressor technology. For lower pressure ranges, the Roots principle of isochoric compression is the first choice, in higher pressure ranges the screw compression principle with internal compression.
The unit concept is based on AERZEN's known and successful Delta range (Delta Blower and Delta Screw) and has been developed further systematically.

Versatility in numbers
· Suction volume flows from 110 $m^3$/h to 9.000 $m^3$/h
· Regulation range from 25 to 100%
· overpressures up to 1,500 mbar
· Nominal sizes DN 100 to DN 300

Applications
· Wastewater cleaning
· Drinking water treatment
· Ventilation of rivers and lakes and much more

Your advantages
· Extraordinary energy efficiency
· Reduced life-cycle costs
· Significantly increased range of application and pressures
· High levels of reliability, long service life
· Reduced maintenance needs
· Process air 100 % free of oil and absorption materials
· Made by AERZEN

# TECHNOLOGY.

Two profiles. One packaged unit.
Delta Hybrid is the perfect synthesis of positive displacement blower and screw compressor. The innovative rotary lobe compressor uses two different rotor profiles in one system: A twisted 3+3 blower profile, aimed at lower pressure differences up to 800 mbar. Plus, a 3+4 compressor profile, designed for higher pressures up to 1,500 mbar.

Result: a new efficiency for compressed air applications. In contrast to positive displacement blowers, the process air is moved diagonally through the stage. Conveying chambers are built from the rotors and the housing walls here as well. It is a significant difference that, depending on the rotor profile, internal compression or an increased delivery level is achieved.

Specially designed 3+4 compressor profile with interior compression for lower pressure applications

*3+3 Blower profile with twisted shafts and patented pulse charging as well as lower crushing losses*

Compression principle of twisted 3+3 rotary piston profile (Delta Hybrid L)
In general, the twisted rotary pistons use isochoric compression, just as the straight positive displacement blower. This profile in combination with the stage concept utilises physical effects to achieve an energy advantage. The diagonal flowing of the medium in connection with the flowing opening of the conveying chamber reduces the recoil and thus ensures that the blower stage is filled up better. The so-called gas-dynamic shock is also utilised to achieve a pre-compression of the medium in the conveying chamber. This increases the volumetric efficiency of this blower.

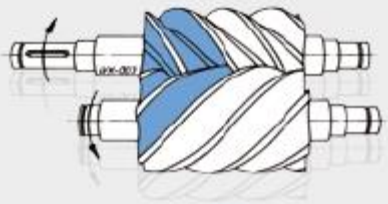
$\eta_V$: Volumetric volume $\eta_V = Q_1 / Q_0$
Theoretical efficiencyflow whichQis defined by the volume
$Q_0$: of the conveying chambers in the blower
$Q_1$: Usable volume flow

If the usable volume flow is increased (e.g. because the blower stage is filled up better) when the size of the conveying chamber remains the same, the volumetric efficiency is increased.

Gas-dynamic shock:

If a compressible medium, which flows in an extending space (e.g. a pipeline) comes to a sudden stop (e.g. through a suddenly closing slide) an impulse occurs. This impulse moves backwards through the space from the position of the stop to the inlet (similar to the speed of sound). As the impulse moves, the medium behind the impulse compresses. When the impulse reaches the inlet, the medium relaxes again. However, if the space is closed at the inlet before the impulse can reach it, an internal compression has occurred in this chamber. In this case, the degree of compression depends on the progress of the impulse in the space before the opening is closed. Assuming that in principle, the twisted rotary piston profile uses isochoric compression, the influence of the coupling performance can be explained by the following formula.

1



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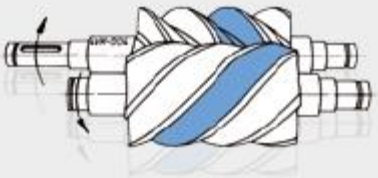

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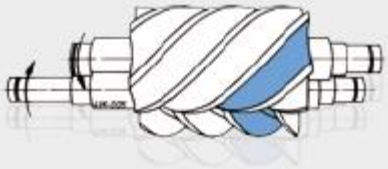
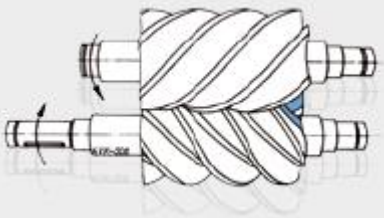


4



1 Suck in
Air inlet through the air inlet opening in the open screw threads on the suction side of the rotors

2/3 Compression process
Continuous turning of the rotors closes the air inlet opening, oil is injected, the volume decreases, the pressure increases

4 Exhaust
The compression is complete, the discharge pressure has been achieved. Expulsion of exhaust air begins

$$P_K = P_{th} + V = Q_0 * (dp)^V$$

As you can see, the pressure difference has a direct impact on the coupling performance $P_K$. The pressure difference can be easily defined by the following formula:

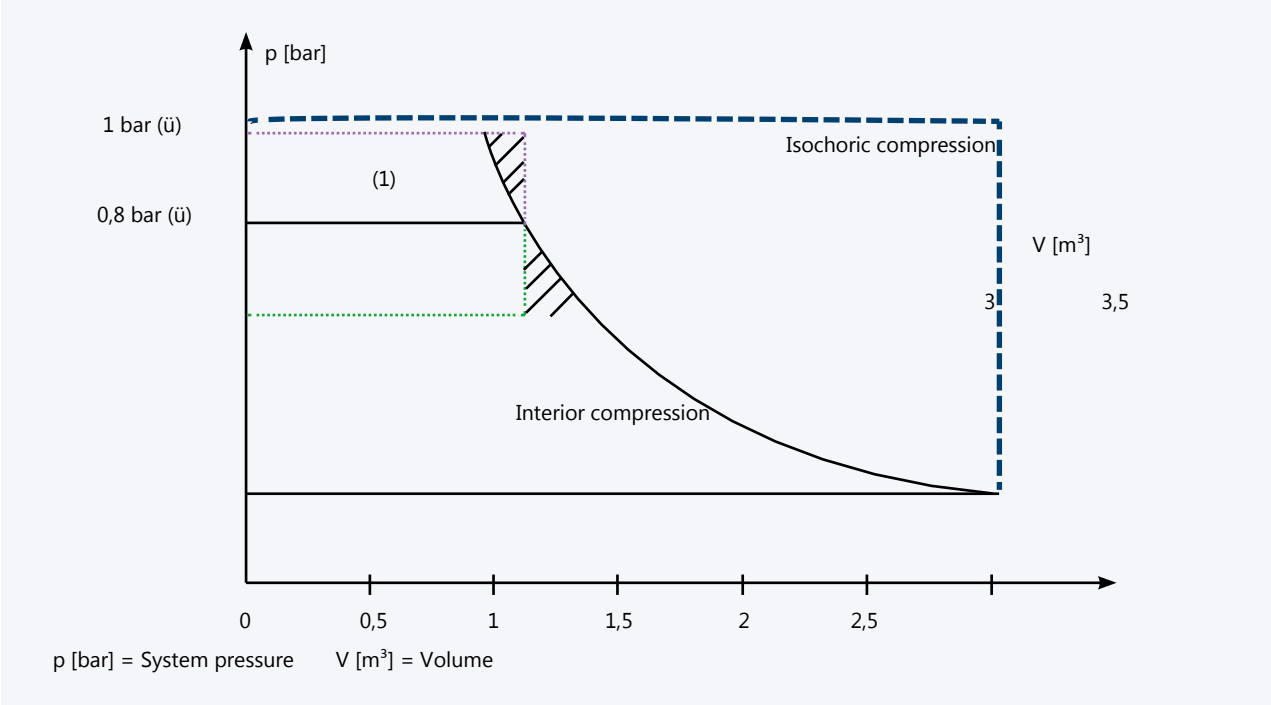
$$dp = p_2 - p_1$$

As it does not increase linearly with the pressure difference dp, the coupling performance which is required to convey the same volume flow.

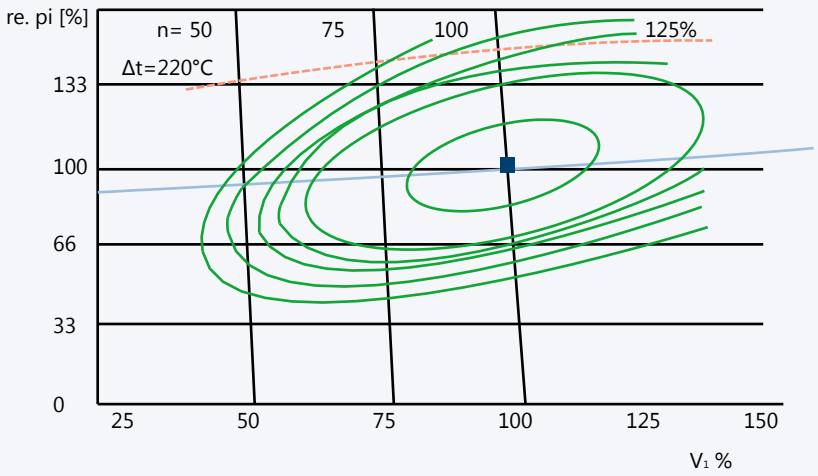
The influence of internal compression on the power requirement becomes more obvious for a screw profile.

Compression principle 3+4 screw profile (Delta Hybrid S/H)
When a medium is compressed by the screw profile, isochoric compression occurs only partially. The largest part of the necessary compression power is realised by internal compression. Energy can be saved compared to isochoric compression because the pressure ratio within the stage is defined. If the internal pressure ratio corresponds to the downstream system pressure, the energetically disadvantageous isochoric compression would not occur.
The process air is conveyed diagonally through the stage for the screw profile as well. The conveying space is also created by the rotor profile and the stage housing.

The meshing of the rotors prevents a streaming back between the rotors and thereby defines the conveying direction. The rotation movement of the screw transports the medium from the suction side on the top to the pressure side opposite. Due to a defined size of the opening of this pressure side, the medium is pre-compressed to a specified pressure.
Depending on the system pressure, the internal compression means that, compared to isochoric compression, conveyance begins with a defined admission-pressure. This means that the energetic effort which would have been required to convey against the system pressure is now already partly (ideally fully) utilised in the stage. This results in a reduced power requirement.



We can illustrate this power saving using the p-V diagram shown above. Assuming that the area of the diagram corresponds to the required power consumption, isochoric compression (of a positive displacement blower) for a system pressure of 1 bar (ü) would require the power as shown by the area bordered by the dashed line (----------). In this example, the stage compresses to 0.8 bar (ü) on the inside. This internal compression requires less power, as the solid line curve in the diagram shows. The medium is moved into the system with an admission-pressure of 0.8 bar (ü). This means only 0.2 bar (ü) is required for isochoric compression which is illustrated in the diagram by the red rectangle (1). The difference of areas of the internal compression and isochoric compression represent the different power consumptions which are required to compress the same volume.




· Efficiency up to 76%
· High regulation range (25% - 100%)
· Almost constant efficiency at partial load

Performance curve of a KA
Characteristic curve
Design point

Characteristics of the positive displacement blower
About 90% of the life-cycle costs of a compressor are energy costs. A number which can become a challenge. Everywhere where environmental concerns and global competition require mobilising every potential. AERZEN meets this challenge: up to 15% energy saving. With a ROI which can be achieved after two years depending on volume flow and compression. That is Delta Hybrid.

# STANDARD SCOPE OF SUPPLY.

AERZEN Rotary lobe compressor
· Guaranteed oil-free as per Class 0 by using proven piston ring labyrinth deals according to ISO 8573-1
· Rotary lobe compressor stage with integrated pulsation decrease for noise reduction
· Two efficient piston profiles for the optimal use for each application
· Flow-optimised inlet and outlet openings to reduce return flow losses
· Patented bearing specifically designed for the rotary lobe compressor with a service life of up to 60,000 hours
· Hardened and polished helical control gears made from case hardening steel 16MnCr5 for utmost smoothness and a long service life

Suction AERZEN standard packaged unit
· Suction via flow-optimised acoustic hood louver
· Patented suction cone to reduce inlet noises
· Absorption-material not necessary by moving the absorption material in front of the filter
· Suction silencer with integrated replaceable filter cartridge as standard according to EU4

Discharge side AERZEN standard packaged unit
· Base frame with integrated discharge silencer with completely wear-free reflexion soundproofing principle
· Avoidance of ventilation system contamination with detached insulation material due to absorption-material-free soundproofing
· Patented base support with integrated spark arrestor certified for ATEX applications.
· Broadband noise reduction over the entire speed range

AERZEN Instrumentation
· Easy reading off of values from the front of the machine
· Display of present discharge pressure.
· Suction pressure gauge with an integrated maintenance indicator for the filter cartridge in suction silencer
· Reading off of oil level also possible during operation at integrated rising pipe with min. and max. display


AERZEN standard acoustic hood
· Acoustic hood with sound-absorbing foam lining
· Self-supporting acoustic hood construction with transport openings for forklift and lift truck and integrated oil collection sump
· Space-saving side-by-side installation.
· Maintenance flaps on the front and back side for easy maintenance and revision
· oil level can be read off from the front during operation
· UV-resistant and durable powder coating in several layers
· Fresh air suction from the front side of the packaged unit

AERZEN belt drive
· Fully automatic and maintenance-free belt tension
· Belt drive adapted perfectly to the required volume flow
· Simple service and replacement of V-belt.
· Integrated overload protection due to load-transmitting V-belt

AERZEN Hinged motor mounting plate
· Base frame with integrated, self-tensioning hinged motor mounting plate

AERZEN Machinery mounting
· Reduction of noise emissions through the floor due to assembly on flexible machinery mounting
· Aligning of the packaged unit is made easier by the machinery mounting

AERZEN Standard motor
· Use of highly energy-efficient 2-pole motors with energy efficiency class IE3
· Motor has protection class IP54 as well as insulation class F
· Design of motors with relevant technical redundancy to ensure a long service life
· Adjusted motor weight for design of automatic belt tensioning device via the hinged motor mounting plate
· Use of enforced bearing for compensation of resulting axial forces by the belt drive
· Re-lubrication interval significantly increased compared to the standard and therefore offers a long service interval
· Version with 3 preresistors as standard constructed in motor terminal box to protect the motor

AERZEN Safety valve
· Compact construction directly at the base frame
· Standard settings are 50 mbar above system pressure
· Ensures safe operation


AERZEN
Delta Hybrid

# PERFORMANCE DESCRIPTION OVERPRESSURE.
# DELTA HyBRID - DESIGN S/L

## Pos. 1) Rotary lobe Compressor

To be supplied as complete compact packaged unit ready for connection with all accessories necessary for safe operation.
For the delivery of completely pure process air, oil-free acc. to ISO 8573-1 Class 0 with TÜV certificate and on the discharge side a sound reduction without any absorption material to ensure the quality of air.
Packaged unit with CE-standard marks and documentation, complying with the regulations of the following guidelines:
· Machine Directive 2006/42/EC
· Electromagnetic Compatibility 2004/108/EC
· Pressure Equipment Directive 97/23/EC
· Protection objectives of the low-voltage directive acc. to enclosure 1, no. 1.5.1.

Make: Aerzener Maschinenfabrik
Type: Delta Hybrid

Description of the stage
· Rotary lobe compressor stage for oil-free conveying acc. to Class 0 (ISo 8573-1) and compression of air, performance-optimized positive displacement machine with minimum flow losses

*optionally* with twisted rotary pistons (3+3) and patented volumetric efficiency increase, type D 17 L up to D 75 L

*or* with low-pressure rotor profile (3+4) and internal compression, type D 12 S up to D 152 S

· Housing parts out of EN-GJL-250, rotary pistons and shafts statically and dynamically balanced
· Stage D 17 L up to D 75 L: rotary pistons and shafts made of tempering steel C45N
· Stage D 12 S up to D 152 S: rotors and shafts out of tempering steel C45N
· Gear wheels helically geared, hardened and ground, fixing onto the shafts by means of conical press-on taper
· Bearings of the shafts in amply dimensioned roller bearings
· oil splash lubrication with additional oil throwers (D 75 L and D 62 S) resp. integrated oil supply (D 17 L up to D 46 L and D 12 S, D 24 S, D 36 S, D 98 S, D 152 S) by mechanically driven oil pump, oil overflow valve and oil filter
· Sealing of the conveying chamber by spring-sealing disc seals with neutral chamber and oil return thread, sealing of the driving shaft by tip seal.

Packaged unit description
· The stage is mounted on a torsion-resistant base support in which the discharge silencer is integrated.
· Structure-borne noise- and vibration dampening mounting of the packaged unit on flexible machine feet.
· The discharge silencer is designed, manufactured and tested acc. to the current pressure device guideline PED 97/23/EC (AD 2000). Supply with CE marks and corresponding documentation. The broadband sound reduction covering the whole speed range is effected by metallic completely wear-free silencer installations without using absorption materials. On this way, a completely sound reducing effect is given for the total period of use.
· Narrow V-belt drive, belt guard (packaged unit without acoustic hood)
· Hinged motor mounting plate as tensioning device for belt drive, the automatic belt re-tensioning is effected by the motor weight exclusively.
· The filter silencer is directly flanged onto the suction socket of the blower. For maintenance purposes the housing is provided with a detachable cover so that the filter element can be easily removed. The absorption material is located upstream of filter element viewed from direction of flow.
· The temperature-resistant check valve (shaft-borne) is integrated in the connection housing so that the flap insert can be checked easy to maintain from outside, without disassembly of the housing.
· The pressure valve for fuse protection of the packaged unit is designed as equipment part with safety function acc. to pressure device guideline PED 97/23/EC.
· Connection of the pressure piping by flexible connection with hose clamps at the rear front side.
· Main maintenance side: Front side
· A service kit with initial oil filling, oil filling funnel, hinged motor mounting plate, oil drain hose is part of the delivery.

Performance data

| | | | |
|---|---|---|---|
| Conveyed medium | | | atmosph. air |
| Intake volume flow | $m^3/min$ | : | ..... |
| Volume flow handled at normal condition | $Nm^3/h$ | : | ..... |
| Intake pressure (abs.) | bar | : | ..... |
| Pressure increase | bar | : | ..... |
| Intake temperature | °C | : | ..... |
| Relative air humidity | % | : | ..... |
| Discharge temperature | °C | : | ..... |
| Motor speed | 1/min | : | ..... |
| Compressor shaft power | kW | : | ..... |
| Motor rating | kW | : | ..... |

*(Dimensional tolerance on intake volume and coupling power: ± 5 %)*

*Options*

· Drive with constant speed
· Drive via pole-changing motor
· Drive via frequency converter
· Suction via filter
· Suction via piping, filter with flexible pipe connection (ISO) provided for suction piping.

Selected size: D 17 L up to D 75 L *or* D 12 S up to D 152 S Delta Hybrid

Connection pressure piping: DN .....

Connection suction piping: DN ..... only for suction via piping
*(option)*

Driving motor

· Motor acc. to IEC standard, type of construction IM B3, type of protection IP 55 - Efficiency class IE 3,
- Class of insulation F / used acc. to B,
- with 3 PTC resistors for winding monitoring,
- with re-lubrication device for bearings from size 160M,
- Bearings suitable for belt drive
- Motor suitable for operation on frequency converter

| | | | |
|---|---|---|---|
| · Nominal voltage / nominal frequency | V / Hz | : | ..... |
| · Nominal power of motor | kW | : | ..... |
| · Nominal speed of motor | rpm | : | ..... |
| · Motor size | | : | ..... |
| · Nominal current | A | : | ..... |
| · Starting current | A | : | ..... |

*Option*

Motor start-up direct star-delta on frequency converter
soft starting

Start unloading device
· Pneumatically acting start unloading device Aeromat, required for star-delta starting of the motor, mounted on packaged unit
· Additional solenoid valve standard 24 V DC (de-energized closed; other voltage available) mounted on start unloading device, for star-delta starting of pole-changing motors *(option)*

Instrumentation
· Pressure gauge for discharge pressure with glycerine filling ø 63 mm, mounted on packaged unit or installed in front of acoustic hood wall
· Maintenance indicator for filter contamination ø 63 mm, mounted on packaged unit or installed in front of acoustic hood wall
· Pressure gauge for oil pressure with glycerine filling ø 63 mm, mounted on packaged unit or installed in front of acoustic hood wall for types D 17 L up to D 46 L and D 12 S, D 24 S, D 36 S, D 98 S and D 152 S
· oil pressure switch with types D 17 L up to D 46 L and D 12 S, D 24 S, D 36 S, D 98 S and D 152 S

*Options*
· Intake pressure switch for filter monitoring
· Discharge pressure switch
· Contact thermometer discharge temperature with capillary line

Instruments mounted on packaged unit, incl. impulse lines,
transmission of a potential-free contact to control at site, switch wired on clamp

| | | |
|---|---|---|
| Packaged unit weight: | Approx. ..... | kg |
| Finish: | Manufacturer standard, colour RAL 5001 | |

| | | |
|---|---|---|
| Supply completely | Pc. ..... | ..... EUR / piece |
| | | ..... EUR / total |

## Item 2) Acoustic hood

for rotary lobe compressor ..... ..... Delta Hybrid

· Acoustic hood made of galvanized steel with oil drip pan and finishing coat

· Transport of the acoustic hood possible by fork lift truck

· Segmental design with internal lining to reduce the sound pressure level of the machine noise

from ..... dB(A) to ..... dB(A) (level with sound-insulated piping)
(Sound level in 1 m distance from the outline of the packaged unit in the free field, sound measurement acc. to DIN 45 635, DIN EN ISO 3744 and DIN EN ISO 2151)

Acoustic hood ventilation
Electrically driven fan (400 V / 50 c/s)

| | |
|---|---|
| Supply air openings: | front on the cold side of the packaged unit |
| Exhaust air openings: | rear on the hot side of the packaged unit |
| Main operation and maintenance side: | front face with detachable, ample segments |
| Rear face: | with removable segment for user-friendly accessibility to the pressure valve and start unloading device |

· oil level control indicator integrated outside into acoustic hood front (main operating side)
· The oil level control can be effected from outside without opening the acoustic hood with running rotary lobe compressor
· oil filling and -draining is simply carried out via the integrated filling reservoir
· The oil system is tubed ready for operation
· Acoustic hood designed for arrangement of several packaged units side-by-side
· Main maintenance side: Front side

A terminal box is integrated in the acoustic hood rear side, in which the power supply unit (standard 400-500 V 50/60c/s) is for the elctric oil demister, AERtronic (option 3). If round instruments were selected, then all pressure switches / temperature switches (as far as selected) are installed potential-free on terminal.

***Option***

- Acoustic hood for indoor installation
- Acoustic hood for outdoor installation

Weight of the hood: Approx. ..... kg
Finish: Manufacturer's standard, colour RAL 5001 / front elements RAL 7047, powder coating

Supply completely Pc. ..... ..... EUR / piece
..... EUR / total

## Item 3) *Option:* AERZEN blower control AERtronic

The packed unit is equipped with the operation- and control device performing the following tasks:
· Control of a power control cabinet (star-delta-switching, direct operation or frequency converter) provided by customer
· Monitoring of the limiting values of the rotary lobe compressor
· Recording, visualization and storing of the measured data
· Counting of the operation and service hours
· output and recording of events

AERZEN control unit AS300B AERtronic
· for operation / monitoring of a rotary lobe compressor and the control of a power cabinet provided by customer or as option.
· Visualization and recording of operation data,
· Provision of service, error and maintenance information, navigation and operation via touch screen.
· Working hour meter, monitoring of winding temperature of the driving motor as well as monitoring of intake pressure (filter contamination), discharge pressure, oil pressure and discharge temperature.
· Basic module and extension modules with digital and analogue inputs / outputs

Included are:
· Transmitter for suction pressure, discharge pressure, oil pressure
· Sensors for discharge temperature and oil temperature
· Supply voltage 400 -500V 50/60 c/s

Power supply panel: Not included, customer's scope of supply

Pc. ..... ..... EUR / piece
..... EUR / total

*Options*

- Extension with Frequncey converter module, signal 4 – 20 mA
- Extension with interface module RS 485 (2-wire) for the connection with Profibus-DP (surcharge)

# PERFORMANCE SPECIFICATION OVERPRESSURE.
# DELTA HyBRID - DESIGN H

## Item 1) Rotary lobe compressor

To be delivered as complete compact unit ready to be connected with all additional parts required for safe operation. For conveying completely pure process air, oil-free operation, TÜV-certified according to ISO 8573-1 of Class 0 and on the process side absolutely absorption-material-free soundproofing, to secure the air quality.

Packaged unit with CE label and documentation, conforms with regulations of the following guidelines:

- Machinery Directive 2006/42/EC
- Electromagnetic Compatibility 2004/108/EC
- Pressure Equipment Directive 97/23/EC
- Protective regulations of the Low Voltage Directive in accordance with Appendix I, No. 1.5.1

Make: Aerzener Maschinenfabrik
Type: Delta Blower Generation 5

Description of stage
- Rotary lobe compressor stage for oil-free conveying of Class 0 (ISo 8573-1) and compression of air, performance-optimised displacement units with minimal flow losses with low pressure rotor profile (3+4) and interior compression, Type D 12 H to D 98 H
- Housing parts from EN-GJL-250, rotary pistons and shafts statically and dynamically balanced
- Stage D 12 H to D 98 H: Rotors and shafts made from tempered steel C45N
- Helical gears, hardened and polished, mounted onto the shafts with taper interference fit
- Mounting of shafts in generously dimensioned anti-friction bearings
- oil splash lubrication with additional oil throwers (D 62 H) or integrated oil supply (D 12 H to D 36 H and D 98 H) using mechanically driven oil pump, oil overflow valve and oil filter
- Sealing off of conveying chamber using spring seal washers with neutral space and oil return windings, sealing off of drive shaft with tip sealing technology

Unit description
- The stage is mounted to a torsion-resistant base frame with an integrated pressure silencer.
- Construction of the unit on flexible machinery mounting which absorbs structural and vibration noises.
- The pressure silencer is constructed, manufactured and tested using the current guidelines of the Pressure Equipment Directive PED 97/23/EG (AD 2000). Supplied with CE label and relevant documentation. The broadband noise reduction over the entire speed range is achieved without the use of absorption materials by using metal, completely wear-free sound silencer units. A complete soundproofing effect is given over the entire usage period.
- Narrow V-belt drive, belt guard (unit without acoustic hood)
- Hinged motor mounting plate as tensioning device for belt drive, the automatic tensioning of the belt occurs through the weight of the motor alone
- The filter silencer is flanged directly onto the inlet socket of the blower. The housing is fitted with a removable lid for maintenance purposes so that the filter element can be removed easily. The absorption material is positioned in front of the filter element when considering the flow direction
- The temperature-resistant check valve (on shaft bearing) is integrated into the connection enclosure so that the flap insert can be checked easily from the outside without dismantling the housing.
- The pressure valve to secure the unit is constructed as an equipment part with safety function according to the Pressure Equipment Directive PED 97/23/EG.
- Flexible connection of pressure pipelines using flange compensators at the rear front side
- Main maintenance side: Front side
- A service package with first oil fill, oil fill funnel, lifter for hinged motor mounting plate, oil drain hose is part of the delivery scope

Performance data

| | | | |
|---|---|---|---|
| Conveyed medium | | | atmosph. air |
| Intake volume flow | $m^3$/min | : | ..... |
| Volume flow in standard condition | $Nm^3$/h | : | ..... |
| Intake pressure (abs.) | bar | : | ..... |
| Pressure increase | bar | : | ..... |
| Intake temperature | °C | : | ..... |
| Relative humidity | % | : | ..... |
| Discharge temperature | °C | : | ..... |
| Motor speed | 1/min | : | ..... |
| Compressor shaft power | kW | : | ..... |
| Motor rating | kW | : | ..... |

*(Building tolerance for intake volume flow and coupling power: ± 5 %)*

*Selection positions*

· Drive with constant speed
· Drive via pole-changeable motor
· Drive via frequency converter
· Suction via filter
· Suction via pipeline, filter with flex. pipe connection (ISo) intended for suction pipeline

Selected size: D 12 H bis D 98 H Delta Hybrid

Connection pressure pipeline: DN .....

*Selection position*

Connection suction pipeline: DN ..... only for suction via pipeline

Drive motor

· Motor according to IEC norm, construction type IM B3, protection class IP 55 - Efficiency class IE 3,
- Insulation class F/used acc. to B,
- with 3 PTC resistor sensors for monitoring the winding,
- with re-lubrication device for bearing,
- Bearing suitable for belt drive.
- Motor suitable for operation at frequency converter.

| | | | |
|---|---|---|---|
| · Nominal voltage / nominal frequency | V / Hz | : | ..... |
| · Motor nominal power | kW | : | ..... |
| · Motor nominal speed | 1/min | : | ..... |
| · Motor size | | : | ..... |
| · Nominal current | A | : | ..... |
| · Starting current | A | : | ..... |

*Selection position*

Motor start-up direct star-delta at frequency converter
soft start

Start unloading device
· Pneumatic start-up unloading valve Aeromat, which is necessary for star-delta starting of the motor, is mounted to the packaged unit

*Selection position*
· Additional solenoid valve 230 V / 50 Hz (closed when current less) is mounted to the start-unloading, for star-delta starting of pole-changeable motors
· Solenoid valve 230 V / 50 Hz (closed when current less) as start-unloading. only for unit nominal size DN 50, blower GM 3S

| | |
|---|---|
| Unit: ..... | ..... EUR / unit |
| | ..... EUR / Total |
| Unit weight: | approx. ..... kg |
| Paint: | Manufacturer standard, colour RAL 5001 |
| Deliver completely units | ..... EUR / unit |
| | ..... EUR / Total |

Instrumentation (AERZEN Blower controls AERtronic)
The unit is equipped with the operating and control device AERtronic, which takes on the following tasks:

- Control of the client's power switch cabinet (star-delta circuit, direct operation or frequency converter)
- Monitor limit values of the rotary lobe compressor
- Capture, visualise and save measurement data
- Count operating and service hours
- Issue and log events

AERZEN control unit AS300B AERtronic
· For the operation/monitoring of a rotary lobe compressor and the control of the client's own or optional power cabinet
· Visualisation and saving of operating data,
· Provision of service, error and maintenance information, navigation and operation via TouchScreen.
· operating hour counter, monitoring of winding temperature of drive motor as well as monitoring of intake pressure (filter pollution), discharge pressure, oil pressure as well as discharge temperature
· Basic module and extension modules with digital and analogue inlets/outlets.

Contained within:
· Transmitter for suction pressure, discharge pressure, oil pressure
· Sensors for discharge temperature and oil temperature
· Resistance thermometer PT 1000 to monitor the oil temperature
· Supply voltage 400-500 V 50/60Hz

Power supply panel: not included, must be supplied by client

*Selection position*
· Extension with interface module RS 485 (2-wire) for the connection with the Profibus-DP (additional cost)

## Item 2) Acoustic hood

for the rotary lobe compressor ..... ..... Delta Hybrid

- Acoustic hood made from galvanised steel sheets with oil collecting sump and topcoat
- Acoustic hood suitable for transport with fork lift
- Segment design with interior lining to reduce machine noise pressure level

  from ..... dB(A) to ..... dB(A) (Level with soundproof pipelines)

  (noise level in 1 m distance from unit outline in free field, noise measurements according to DIN 45 635, DIN EN ISO 3744 and DIN EN ISO 2151)

Acoustic hood ventilation
Electrically driven fan ( 400 V 50 Hz )

Supply air openings: at the front on the cold side of the unit
Exhaust air openings: at the rear on the warm side of the unit
Main operating and maintenance side: anterior front side with removable, generous segments

Posterior front side: with removable segment for user-friendly accessibility to pressure valve and start unloading device

· oil level control display integrated outside of the front of the acoustic hood (main operating side)
· The oil level can be checked from the outside without opening the acoustic hood when the rotary lobe compressor is running
· oil can be filled up or drained simply via the integrated fill-up tank
· The oil system is ready to use complete with piping

· Acoustic hood designed for construction of several units directly next to each other

· Main maintenance side: Front side

A terminal box is integrated into the rear wall of the acoustic hood into which the power supply unit (standard 400-500 V 50/60Hz) for oil demisting, AERtronic (Selection position 3) is integrated

Selection position

· Acoustic hood for indoor installation
· Acoustic hood for outdoor installation

Hood weight: approx. ..... kg
Paint: Manufacturer standard, colour RAL 5001 / front elements RAL 7047, powder painting

delivery completely unit ..... ..... EUR / unit
..... EUR / Total

# MAINTENANCE AND REVISION.

The following table describes the standard maintenance for AERZEN rotary lobe compressor: Delta Hybrid.

Maintenance for 1 year

| Amount | Maintenance part | Interval |
|---|---|---|
| 1 | Replace intake filter | After 8000 Oh or annually |

Maintenance for 2 years

| Amount | Maintenance part | Interval |
|---|---|---|
| 2 | Replace intake filter | After 8000 Oh or annually |
| 1 | Replace V-belt | After 16000 Oh or after 2 years |
| 1 | Replace lubrication oil DELTA LUBE 06 | After 16000 Oh or after 2 years |
| 1 | Replace oil filter | After 16000 Oh or after 2 years |

Maintenance for 5 years

| Amount | Maintenance part | Interval |
|---|---|---|
| 4 | Replace intake filter | After 8000 Oh or annually |
| 2 | Replace V-belt | After 16000 Oh or after 2 years |
| 2 | Replace lubrication oil DELTA LUBE 06 | After 16000 Oh or after 2 years |
| 2 | Replace oil filter | After 16000 Oh or after 2 years |

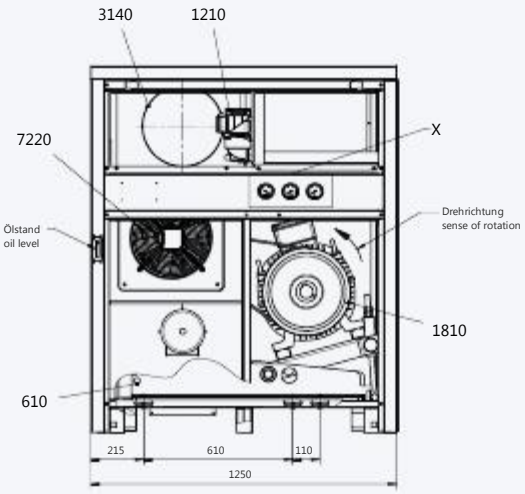
Revision

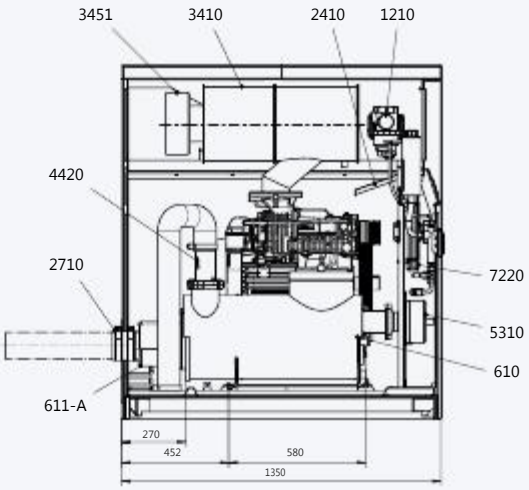
| Amount | Revision part | Interval |
|---|---|---|
| 1 | Exchange after completely revised compressor stage | After 40000 Oh or after 5 years |

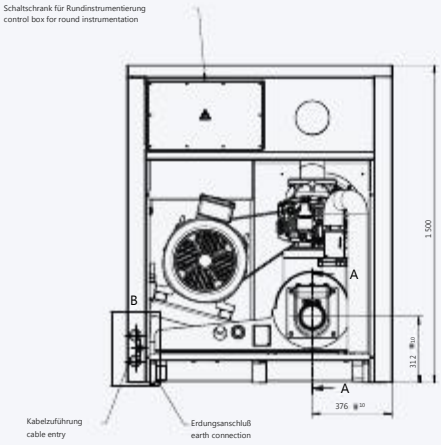
*Oh = operating hours*
*Note: All intervals specified are manufacturer's recommendations.*

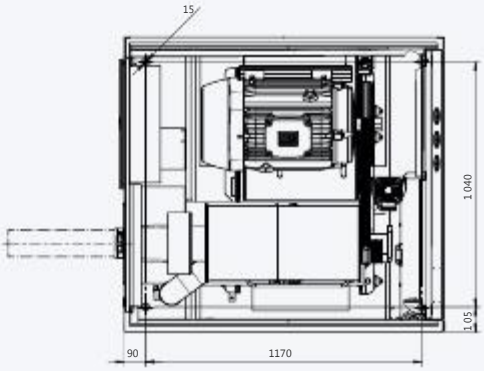
# TECHNICAL DRAWINGS.

## DELTA HYBRID D 12 S/H



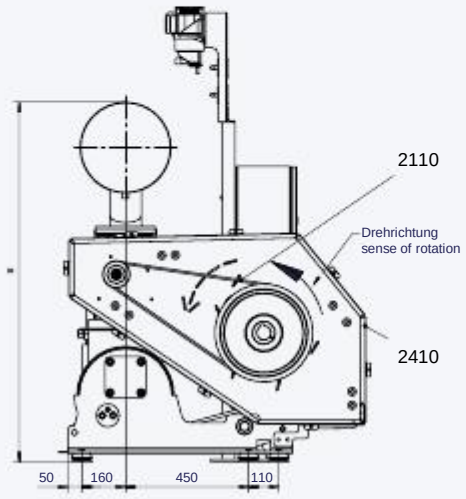



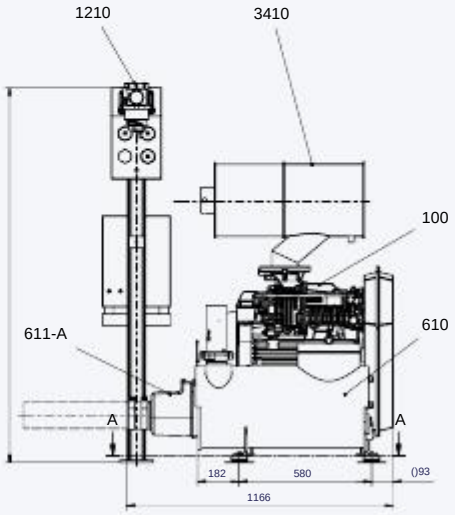



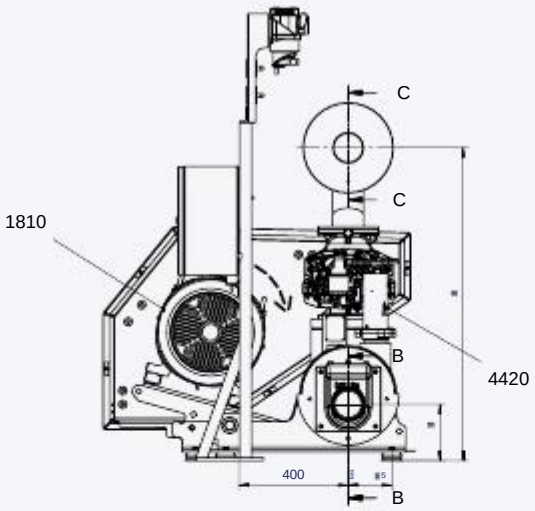

| Pos. | Benennung | Description |
|---|---|---|
| 610 | Grundträger | Base support |
| 611-A | Anschlussgehäuse für Muffe | Connection housing for sleeve |
| 611-B | Anschlissgehäuse mit Flansch -Option- | Connection housing with flange -optional- |
| 1210 | Ölnebelabscheider | Oil demister |
| 1810 | Motor | Motor |
| 2110 | Riemenantrieb | Belt drive |
| 2410 | Riemenschutz -Option- | Belt guard -optional- |
| 2710 | Elast. Rohrverbindung DS -Muffe- | Flexible pipe connection DS -sleeve- |
| 2720 | Elast. Rohrverbindung DS Kompensator -Option- | Flex. pipe connection DS compensator -optional- |
| 3150 | Schallschluckmatte -Option- | Noise absorption mat -optional- |

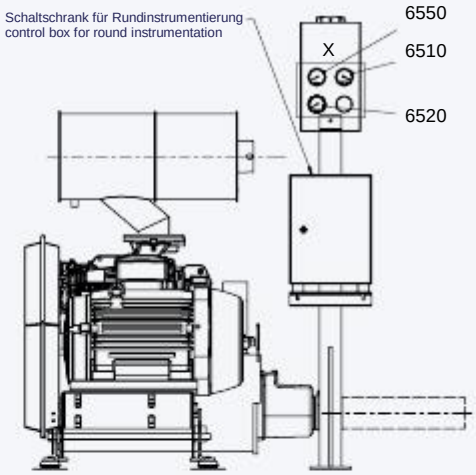
| | | |
|---|---|---|
| 3151 | Ansaugtopf | Suction cup |
| 3410 | Filterschalldämpfer | Filter silencer |
| 3450 | Elast. Rohrverbindung SS -Option- | Flexible pipe connection SS -optional- |
| 4420 | Sicherheitsventil | Safety valve |
| 5310 | Anfahrentlastung | Start unloadng device |
| 6510 | Wartungsanzeiger | Service indicator |
| 6520 | Manometer | Pressure gauge |
| 6550 | Öldrucküberwachung | Oil pressure control |
| 6580 | AERZEN Steuerung AERtronic -Option- | AERZEN control unit AERtronic -optional- |
| 7110 | Schallhaube | Acoustic hood |
| 7220 | Elektrischer Lüfter | Electrical fan |
| 7240 | Abdeckbleck -Option- | Cover plate -optional- |

*Drawing no.: 4000116536*



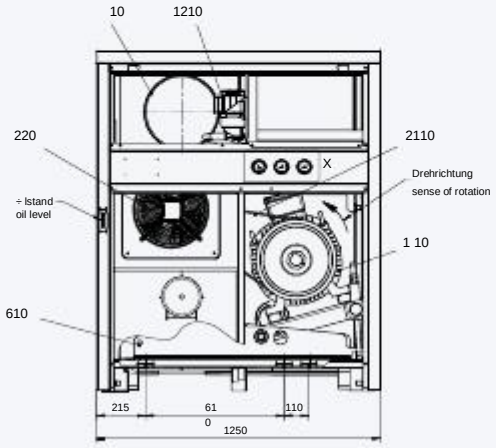



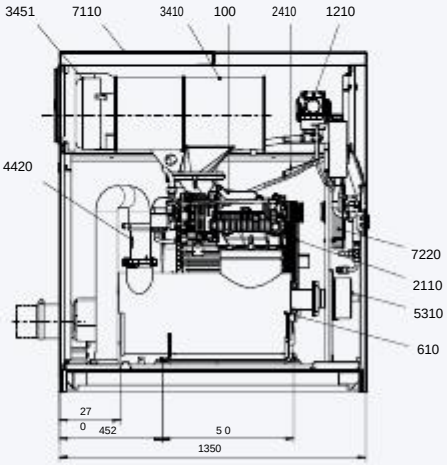



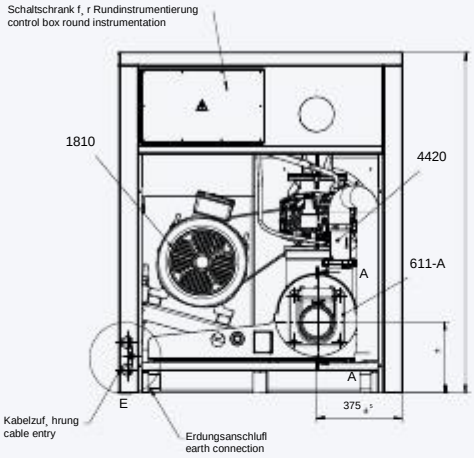

| Pos. | Benennung | Description |
|---|---|---|
| 100 | Drehkolbenverdichter | Rotary lobe compressor |
| 610 | Grundträger | Base support |
| 611-A | Anschlussgehäuse für Muffe | Connection housing for sleeve |
| 611-B | Anschlussgehäuse mit Flansch -Option - | Connection housing with flange -optional- |
| 1210 | Ölnebelabscheider | Oil demister |
| 1810 | Motor | Motor |
| 1820 | Motorbefestigung | Motor connection |
| 2110 | Riemenantrieb | Belt drive |
| 2410 | Riemenschutz | Belt guard |
| 2710-A | Rohrverbindung DS mit Muffe | Flexible pipe connection DS with sleeve |
| 2710-B | Rohrverbindung DS mit Kompensator -Option- | Pipe connection DS with compensator -optional- |
| 3410 | Filterschalldämpfer | Filter silencer |
| 3450 | Rohrverbindung SS Option- | Pipe connection SS -optional- |
| 4420 | Sicherheitsventil | Safety valve |
| 5310 | Anfahrentlastung -Option- | Start unloading device -optional- |
| 6510 | Wartungsanzeiger | Service indicator |
| 6520 | Manometer | Pressure gauge |
| 6550 | Öldruckmanometer | Oil pressure gauge |
| 6580 | Elektrische Steuerung AERtronic -Option- | Electric control AERtronic -optional- |

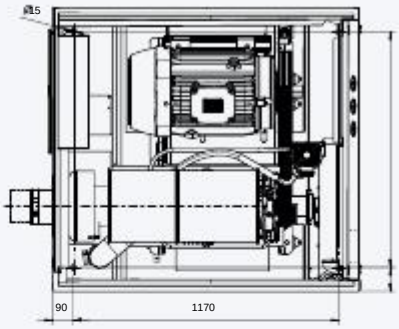
*Drawing no.: 4000129522*

# DELTA HYBRID D 17 L



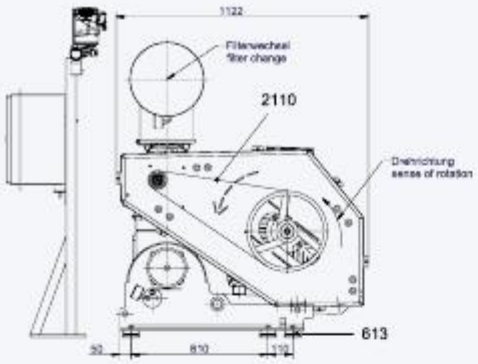



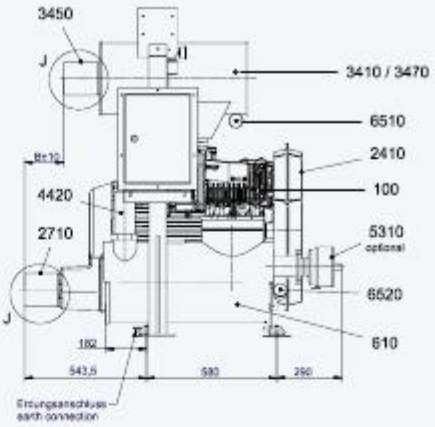



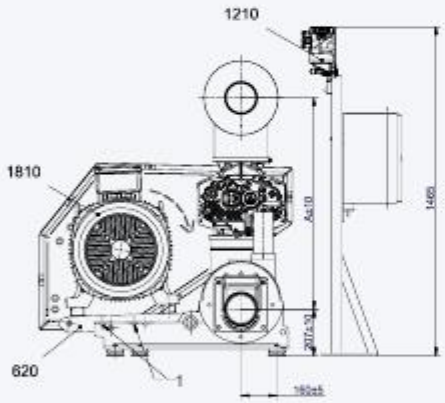

| Pos. | Benennung | Description |
|---|---|---|
| 100 | Gebläsestufe | Blower stage |
| 610 | Grundträger | Base support |
| 611-B | Anschlussgehäuse mit Flansch -Option- | Connection housing with flange -optional- |
| 611-A | Anschlussgehäuse mit Muffe | Connection housing for sleeve |
| 1210 | Ölnebelabscheider | Oil demister |
| 1810 | Motor | Motor |
| 2110 | Riementrieb | Belt drive |
| 2410 | Riemenschutz -Option- | Belt guard -optional- |
| 2710 | Elast. Rohrverbindung DS -Muffe- | Flex. pipe connection DS -sleeve- |
| 2720 | Elast. Rohrverbindung DS-Kompensator -Option- | Flex. pipe connection DS -compensator -option- |

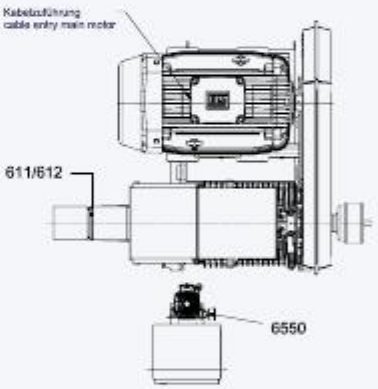
| | | |
|---|---|---|
| 3150 | Schallschluckmatte -Option- | Noise absorption mat -optional- |
| 3410 | Filterschalldämpfer | Filter silencer |
| 3450 | Elastische Rohrverbindung SS -Option- | Flexible pipe connection SS -optional- |
| 3451 | Ansaugtopf | Suction pot |
| 4420 | Sicherheitsventil | Safety valve |
| 5310 | Anfahrentlastung -Option- | Start unloading device -optional- |
| 6510 | Wartungsanzeiger | Service indicator |
| 6520 | Manometer | Pressure gauge |
| 6550 | Manometer Öldruck | Pressure gauge oil pressure |
| 6580 | AERZEN Steuerung AERtronic -Option- | AERZEN control unit AERtronic -optional- |
| 7110 | Schallhaube | Acoustic hood |
| 7220 | Axialventilator | Axial fan |
| 7240 | Abdeckblech -Option- | Cover plate -optional- |

*Drawing no.: 4000117603_02*



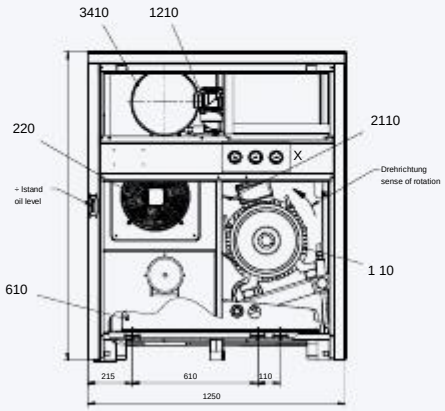



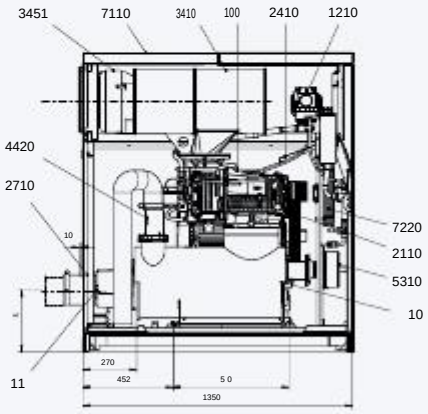

| Pos. | Benennung | Description |
|---|---|---|
| 100 | Gebläsestufe | Blower stage |
| 610 | Grundträger | Base support |
| 611-B | Anschlussgehäuse mit Flansch -Option- | Connection housing with flange -optional- |
| 611-A | Anschlussgehäuse mit Muffe | Connection housing with sleeve |
| 1210 | Ölnebelabscheider | Oil demister |
| 1810 | Motor | Motor |
| 2110 | Riementrieb | Belt drive |
| 2410 | Riemenschutz -Option- | Belt guard -optional- |
| 2710 | Elast. Rohrverbindung DS -Muffe- | Flex. pipe connection DS -sleeve- |

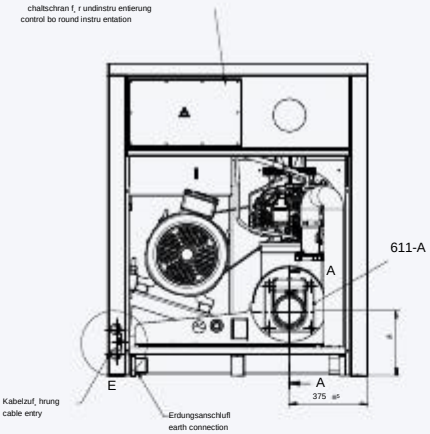
| | | |
|---|---|---|
| 2720 | Elast. Rohrverbindung DS-Kompensator -Option- | Flex. pipe connection DS -compensator -option- |
| 3410 | Filterschalldämpfer | Filter silencer |
| 3450 | Elastische Rohrverbindung SS | Flexible pipe connection SS |
| 3470 | Ansaugfilter | Intake filter |
| 4420 | Sicherheitsventil | Safety valve |
| 5310 | Anfahrentlastung -Option- | Start unloading device -optional- |
| 6510 | Wartungsanzeiger | Service indicator |
| 6520 | Manometer | Pressure gauge |
| 6550 | Öldrucküberwachung | Oil pressure control |
| 6580 | AERZEN Steuerung AERtronic -Option- | AERZEN control unit AERtronic -optional- |

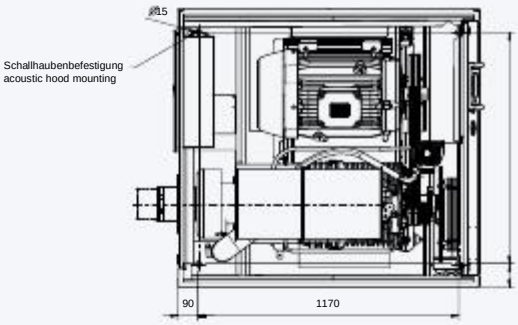
*Drawing no.: 4900104379*

# DELTA HYBRID D 24 S/H



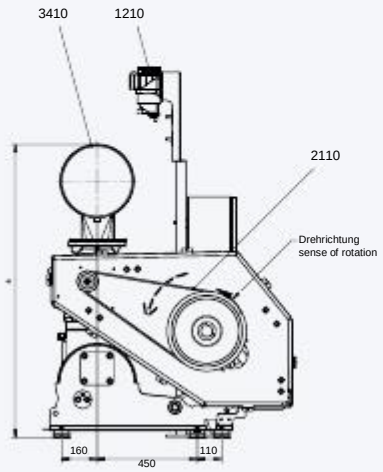



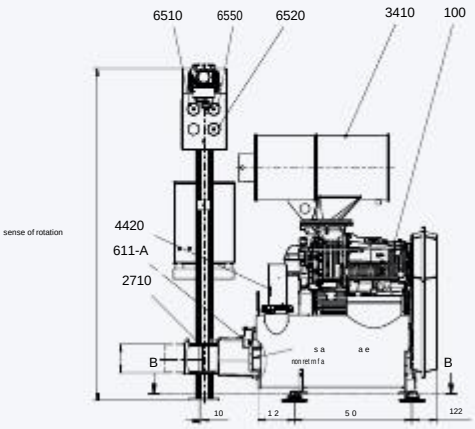



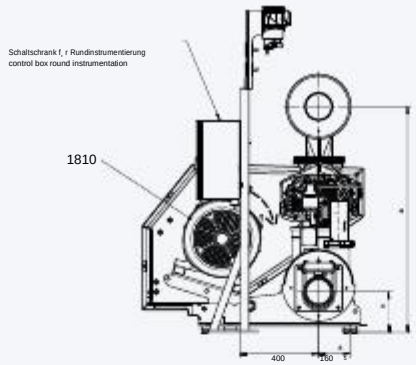

| Pos. | Benennung | Description |
|---|---|---|
| 100 | Verdichterstufe | Compressor stage |
| 610 | Grundträger | Base support |
| 611-B | Anschlussgehäuse mit Flansch -Option- | Connection housing with flange -optional- |
| 611-A | Anschlussgehäuse für Muffe | Connection housing for sleeve |
| 1210 | Ölnebelabscheider | Oil demister |
| 1810 | Motor | Motor |
| 1820 | Motorbefestigung | Motor fastening |
| 2110 | Riementrieb | Belt drive |
| 2410 | Riemenschutz -Option- | Belt guard -optional- |
| 2710 | Elast. Rohrverbindung DS | Flex. pipe connection DS |
| 2710-B | Elast. Rohrverbindung DS-Kompensator -Option- | Flex. pipe connection DS -compensator -option- |

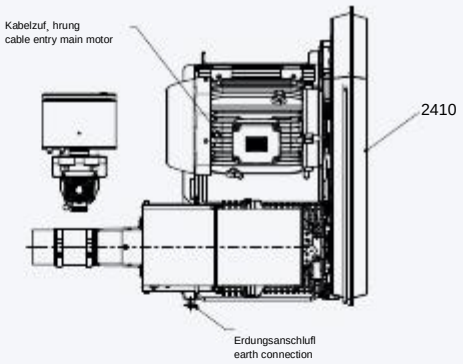
| | | |
|---|---|---|
| 3150 | Schallschluckmatte -Option- | Absorption mat |
| 3410 | Filterschalldämpfer | Filter silencer |
| 3450 | Elastische Rohrverbindung SS -Option- | Flexible pipe connection SS -optional- |
| 3451 | Ansaugtopf | Suction pot |
| 4420 | Sicherheitsventil | Safety valve |
| 5310 | Anfahrentlastung -Option- | Start unloading device -optional- |
| 6510 | Wartungsanzeiger | Service indicator |
| 6520 | Manometer | Pressure gauge |
| 6550 | Manometer Öldruck | Pressure gauge oil pressure |
| 6580 | AERZEN Steuerung AERtronic -Option- | AERZEN control unit AERtronic -optional- |
| 7110 | Schallhaube | Acoustic hood |
| 7220 | Axialventilator | Axial fan |
| 7240 | Abdeckblech -Option- | Cover plate -optional- |

*Drawing no.: 4000124384*



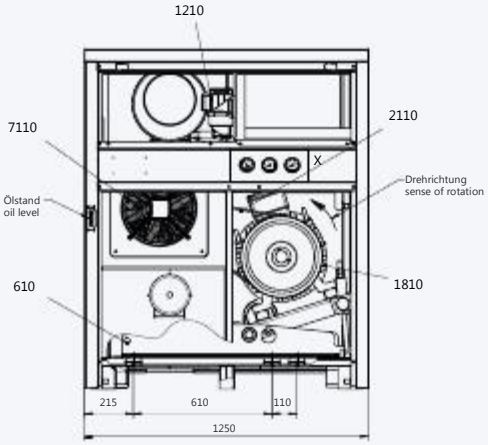



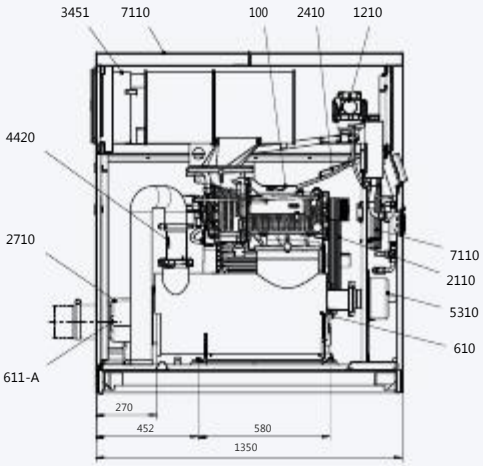

| Pos. | Benennung | Description |
|---|---|---|
| 100 | Verdichterstufe | Compressor stage |
| 610 | Grundträger | Base support |
| 611-B | Anschlussgehäuse mit Flansch -Option- | connection housing with flange -optional |
| 611-A | Anschlussgehäuse für Muffe | connection housing for sleeve |
| 1210 | Ölnebelabscheider | Oil demister |
| 1810 | Motor | Motor |
| 1820 | Motorbefestigung | Motor connection |
| 2110 | Riementrieb | Belt drive |
| 2420 | Riemenschutz | Belt guard |
| 2710 | Elastische Rohrverbindung DS | Flexible pipe connection DS |

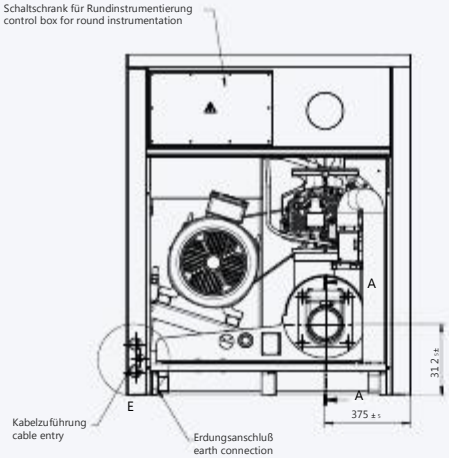
| | | |
|---|---|---|
| 2720 | Elastische Rohrverbindung DS -Kompensator | Flexible pipe connection DS -compensator |
| 3410 | Filterschalldämpfer | Filter silencer |
| 3450 | Elastische Rohrverbindung SS | flexible pipe connection SS |
| 4420 | Sicherheitsventil | Safety valve |
| 5310 | Anfahrentlastung -Option- | Start unloading device -optional |
| 6510 | Wartungsanzeiger | Service indicator |
| 6520 | Manometer | Acoustic hood |
| 6550 | Öldruckmanometer | Oil pressure gauge |
| 6580 | Elektronische Steuerung (AERtronik) -Option für D98S- | Electronic control (AERtronic) -optional for D98S |

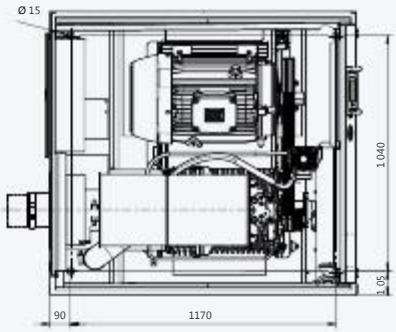
*Drawing no.: 4000130172*

# DELTA HYBRID D 28 L



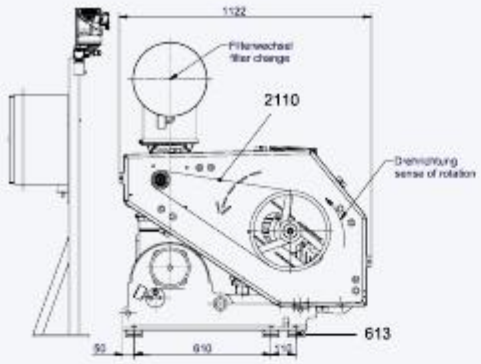



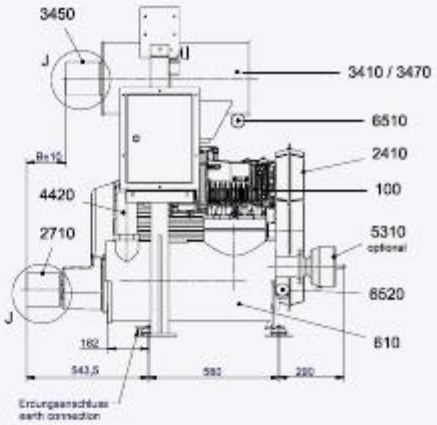



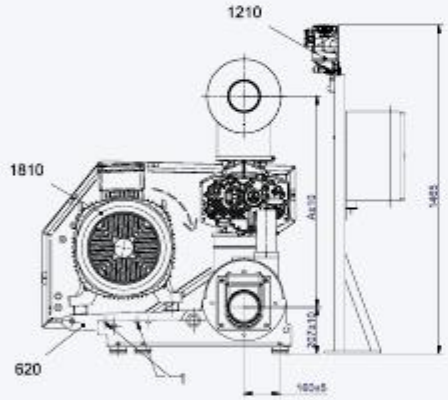

| Pos. | Benennung | Description |
|---|---|---|
| 100 | Gebläsestufe | Blower stage |
| 610 | Grundträger | Base support |
| 611-B | Anschlussgehäuse mit Flansch -Option- | Connection housing with flange -optional- |
| 611-A | Anschlussgehäuse mit Muffe | Connection housing for sleeve |
| 1210 | Ölnebelabscheider | Oil demister |
| 1810 | Motor | Motor |
| 2110 | Riementrieb | Belt drive |
| 2410 | Riemenschutz -Option- | Belt guard -optional- |
| 2710 | Elast. Rohrverbindung DS | Flex. pipe connection DS |
| 2720 | Elast. Rohrverbindung DS-Kompensator- Option | Flex. pipe connection DS -compensator -option- |

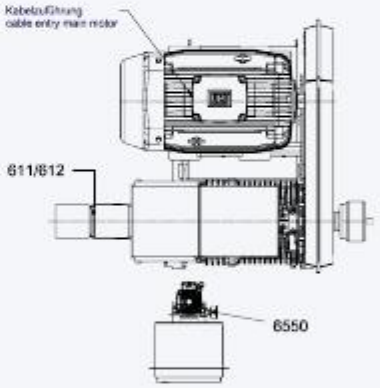
| | | |
|---|---|---|
| 3150 | Schallschluckmatte -Option- | Noise absorption mat -optional- |
| 3410 | Filterschalldämpfer | Filter silencer |
| 3450 | Elastische Rohrverbindung SS -Option- | Flexible pipe connection SS -optional- |
| 3451 | Ansaugtopf | Suction pot |
| 4420 | Sicherheitsventil | Safety valve |
| 5310 | Anfahrentlastung -Option- | Start unloading device -optional- |
| 6510 | Wartungsanzeiger | Service indicator |
| 6510 | Manometer | Pressure gauge |
| 6520 | Manometer Öldruck | Pressure gauge oil pressure |
| 6520 | AERZEN Steuerung AERtronic -Option- | AERZEN control unit AERtronic -optional- |
| 6580 | Schallhaube | Acoustic hood |
| 7110 | Axialventilator | Axial fan |
| 7240 | Abdeckblech -Option- | Cover plate -optional- |

*Drawing no.: 4000124708_01*



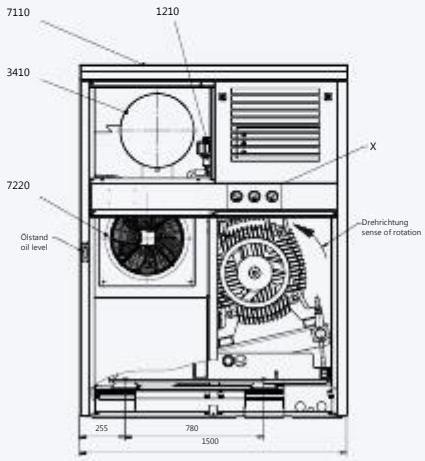



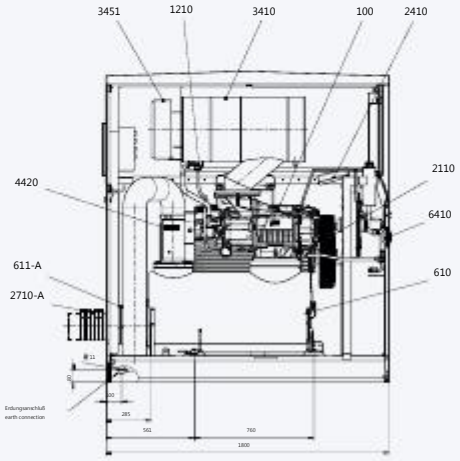

| Pos. | Benennung | Description |
|---|---|---|
| 100 | Gebläsestufe | Blower stage |
| 610 | Grundträger | Base support |
| 611-B | Anschlussgehäuse mit Flansch -Option- | Connection housing with flange -optional- |
| 611-A | Anschlussgehäuse mit Muffe | Connection housing for sleeve |
| 1210 | Ölnebelabscheider | Oil demister |
| 1810 | Motor | Motor |
| 2110 | Riementrieb | Belt drive |
| 2410 | Riemenschutz -Option- | Belt guard -optional- |
| 2710 | Elast. Rohrverbindung DS -Muffe- | Flex. pipe connection DS -sleeve- |

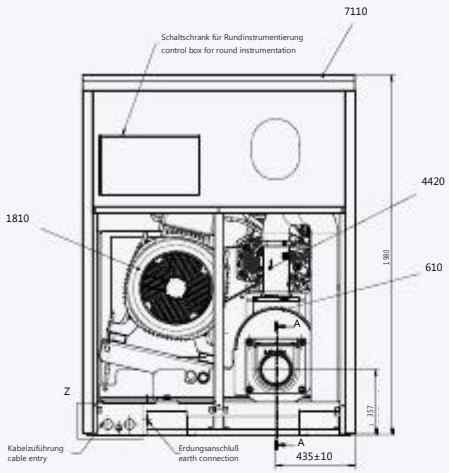
| | | |
|---|---|---|
| 2720 | Elast. Rohrverbindung DS-Kompensator -Option- | Flex. pipe connection DS -compensator -option- |
| 3410 | Filterschalldämpfer | Filter silencer |
| 3450 | Elastische Rohrverbindung SS | Flexible pipe connection SS |
| 3470 | Ansaugfilter | Intake filter |
| 4420 | Sicherheitsventil | Safety valve |
| 5310 | Anfahrentlastung -Option- | Start unloading device -optional- |
| 6510 | Wartungsanzeiger | Service indicator |
| 6520 | Manometer | Pressure gauge |
| 6550 | Öldrucküberwachung | Oil pressure control |
| 6580 | AERZEN Steuerung AERtronic -Option- | AERZEN control unit AERtronic -optional- |

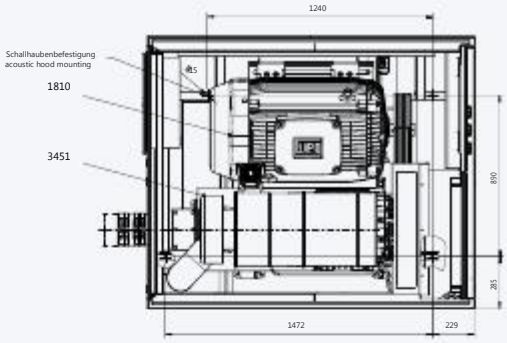
*Drawing no.: 4900104379*

# DELTA HYBRID D 36 S/H



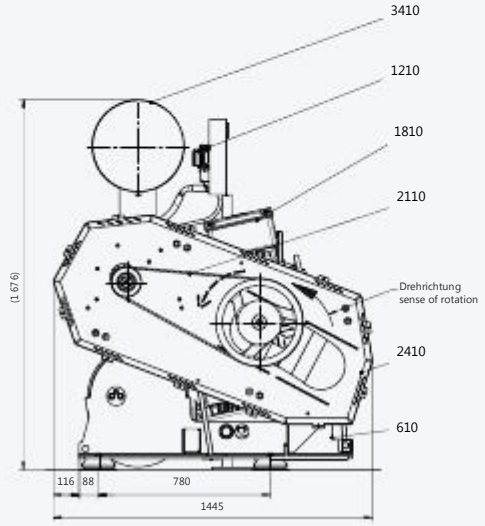



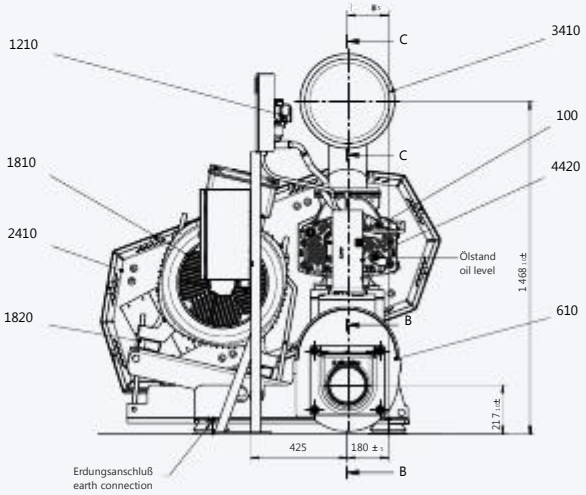



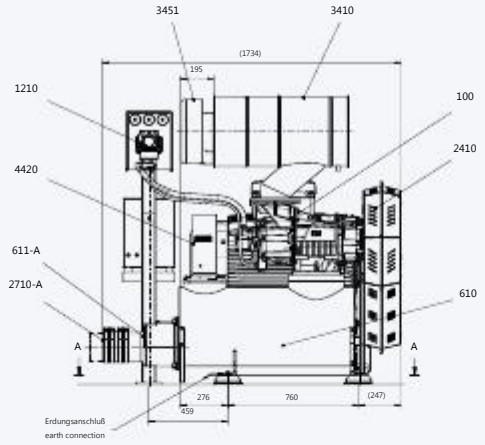

| Pos. | Benennung | Description |
|---|---|---|
| 100 | Drehkolbenverdichter | Rotary lobe compressor |
| 610 | Grundträger | Base support |
| 611-B | Anschlussgehäuse mit Flansch -Option- | Connection housing with flange -optional- |
| 611-A | Anschlussgehäuse für Muffe | Connection housing for sleeve |
| 1210 | Ölnebelabscheider | Oil demister |
| 1810 | Motor | Motor |
| 1820 | Motorbefestigung | Motor fastening |
| 2110 | Riementrieb | Belt drive |
| 2410 | Riemenschutz -Option- | Belt guard -optional |
| 2710-A | Elast. Rohrverbindung DS -Muffe- | Flex. pipe connection DS -sleeve- |
| 2710-B | Elast. Rohrverbindung DS-Kompensator- Option | Flex. pipe connection DS -compensator -option- |

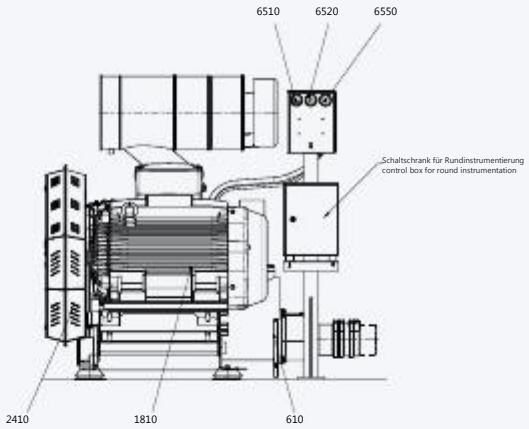
| | | |
|---|---|---|
| 3150 | Schallschluckmatte -Option- | Absorption mat |
| 3410 | Filterschalldämpfer | Filter silencer |
| 3450 | Elastische Rohrverbindung SS -Option- | Flexible pipe connection SS -optional- |
| 3451 | Ansaugtopf | Suction pot |
| 4420 | Sicherheitsventil | Safety valve |
| 6410 | Ölsystem | Oil system |
| 6510 | Wartungsanzeiger | Service indicator |
| 6520 | Manometer | Pressure gauge |
| 6550 | Manometer Öldruck | Pressure gauge oil pressure |
| 6580 | AERZEN Steuerung AERtronic -Option- | AERZEN control unit AERtronic -optional- |
| 7110 | Schallhaube | Acoustic hood |
| 7220 | Axialventilator | Axial fan |
| 7240 | Abdeckblech -Option- | Cover plate -optional- |

*Drawing no.: 4000033613*



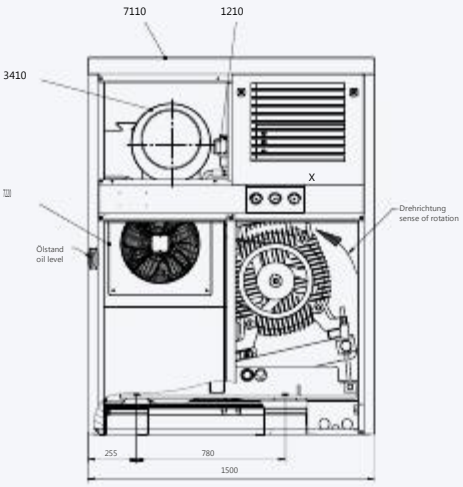



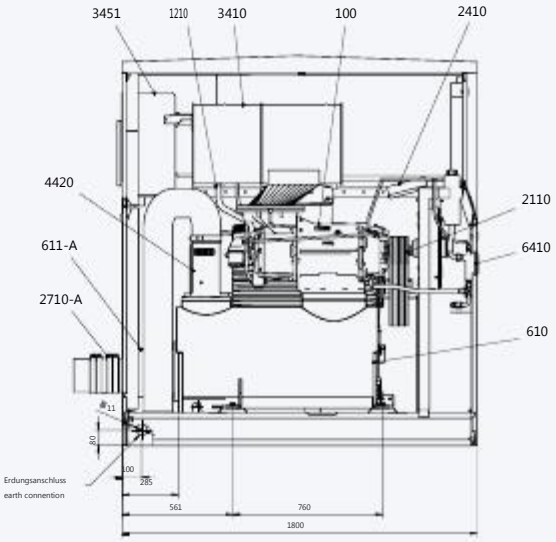

| Pos. | Benennung | Description |
|---|---|---|
| 100 | Drehkolbenverdichter | Rotary lobe compressor |
| 610 | Grundträger | Base support |
| 611-A | Anschlussgehäuse für Muffe | Connection housing for sleeve |
| 611-B | Anschlussgehäuse mit Flansch -Option für D98S- | Connection housing with flange -optional for D98S611- |
| 1210 | Ölnebelabscheider | Oil demister |
| 1810 | Motor | Motor |
| 1820 | Motorbefestigung | Motor fastening |
| 2110 | Riementrieb | Belt drive |
| 2420 | Riemenschutz | Belt guard |
| 2710-A | Rohrverbindung DS mit Muffe | Pipe connection DS with sleeve |

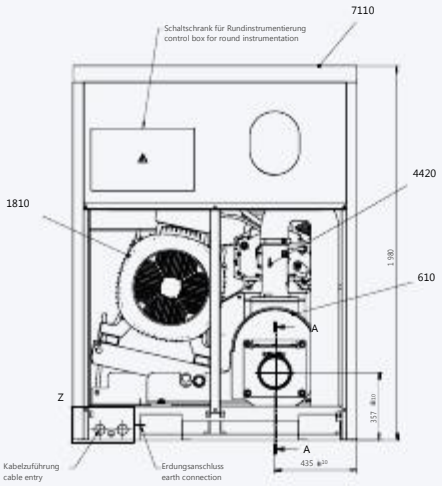
| | | |
|---|---|---|
| 2710-B | Rohrverbindung DS mit Kompensator -Option für D98S- | Pipe connection DS with compensator -optional for D98S- |
| 3410 | Filterschalldämpfer | Filter silencer |
| 3450 | Rohranschluss SS -Option- | Pipe connection SS -optional- |
| 3451 | Ansaugtopf -Option- | Suction pot -optional- |
| 4420 | Sicherheitsventil | Safety valve |
| 5310 | Anfahrentlastung -Option- | Start unloading device -optional- |
| 6510 | Wartungsanzeiger | Service indicator |
| 6520 | Manometer | Pressure gauge |
| 6550 | Oldruckmanometer | Oil pressure gauge |
| 6580 | Elektronische Steuerung (AERtronic) -Option für D98S- | Electronic control (AERtronic) -optional for D98S- |

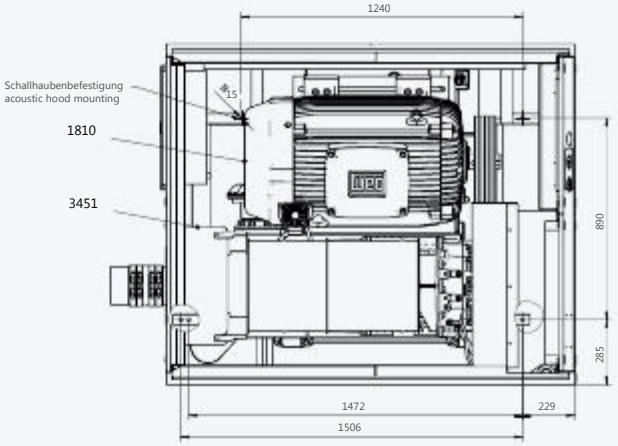
*Drawing no.: 4000074127*

# DELTA HYBRID D 46 L



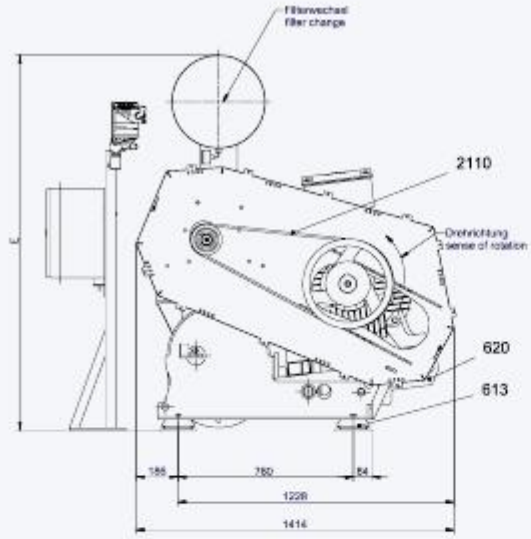



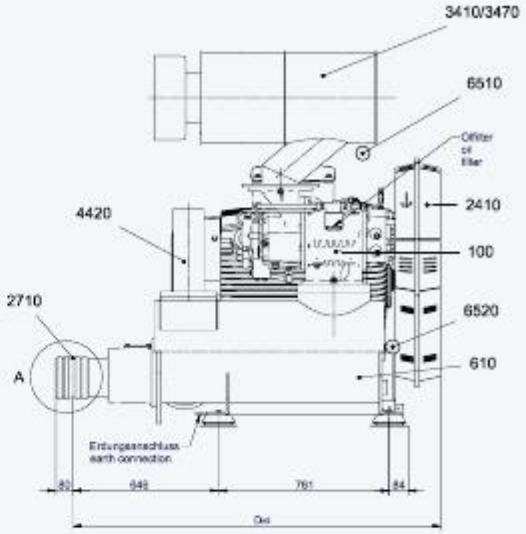



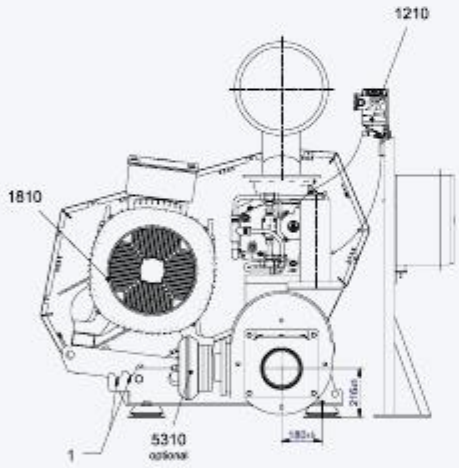

| Pos. | Benennung | Description |
|---|---|---|
| 100 | Drehkolbenverdichter | Rotary lobe compressor |
| 610 | Grundträger | Base support |
| 611-B | Anschlussgehäuse mit Flansch -Option- | Connection housing with flange -optional- |
| 611-A | Anschlussgehäuse für Muffe | Connection housing for sleeve |
| 1210 | Ölnebelabscheider | Oil demister |
| 1810 | Motor | Motor |
| 2110 | Riementrieb | Belt drive |
| 2410 | Riemenschutz -Option- | Belt guard -optional |
| 2710-A | Elast. Rohrverbindung DS -Muffe- | Flex. pipe connection DS -sleeve- |
| 2710-B | Elast. Rohrverbindung DS-Kompensator- Option | Flex. pipe connection DS -compensator -option- |

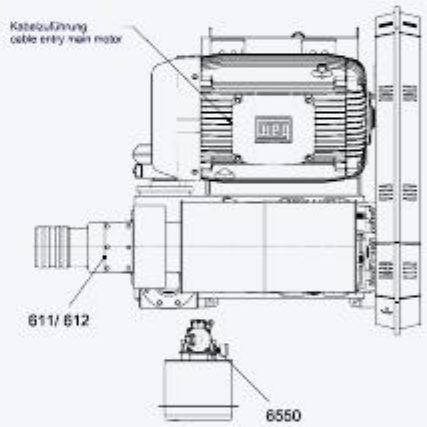
| | | |
|---|---|---|
| 3150 | Schallschluckmatte -Option- | Absorption mat |
| 3410 | Filterschalldämpfer | Filter silencer |
| 3450 | Elastische Rohrverbindung SS -Option- | Flexible pipe connection SS -optional- |
| 3451 | Ansaugtopf | Suction pot |
| 4420 | Sicherheitsventil | Safety valve |
| 6410 | Ölsystem | Oil system |
| 6510 | Wartungsanzeiger | Service indicator |
| 6520 | Manometer | Pressure gauge |
| 6550 | Manometer Öldruck | Pressure gauge oil pressure |
| 6580 | AERZEN Steuerung AERtronic -Option- | AERZEN control unit AERtronic -optional- |
| 7110 | Schallhaube | Acoustic hood |
| 7220 | Axialventilator | Axial fan |
| 7240 | Abdeckblech -Option- | Cover plate -optional- |

*Drawing no.: 4000099934*



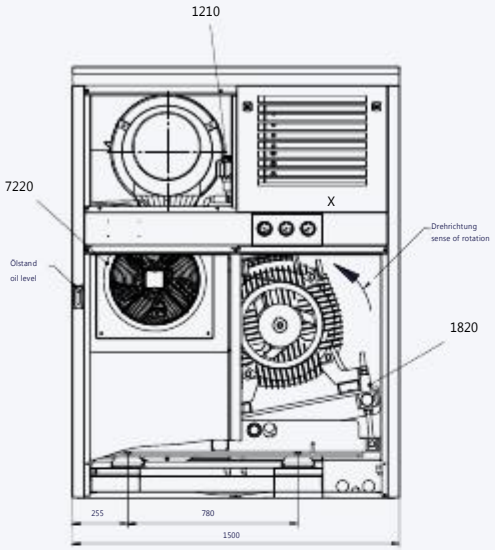



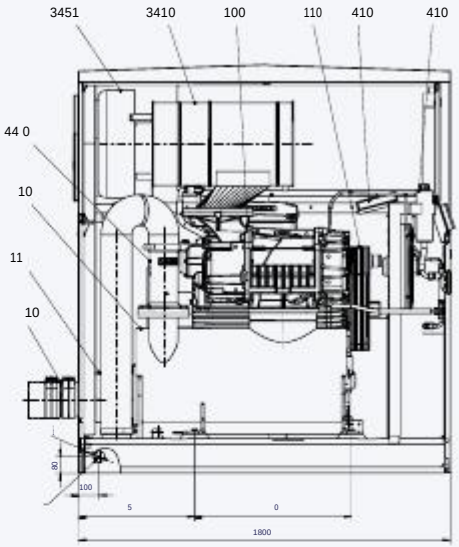

| Pos. | Benennung | Description |
|---|---|---|
| 100 | Gebläsestufe | Blower stage |
| 610 | Grundträger | Base support |
| 611 | Anschlussgehäuse | Connection housing |
| 613 | Elastischer Maschinenfuß | Flex. machinery mounting |
| 620 | Motorwippe | Hinged motor mounting plate |
| 1210 | Ölnebelabschneider für Ölraumentlastung | Oildemister for oil chamber relief |
| 1810 | Motor | Motor |
| 2110 | Riementrieb | Belt drive |

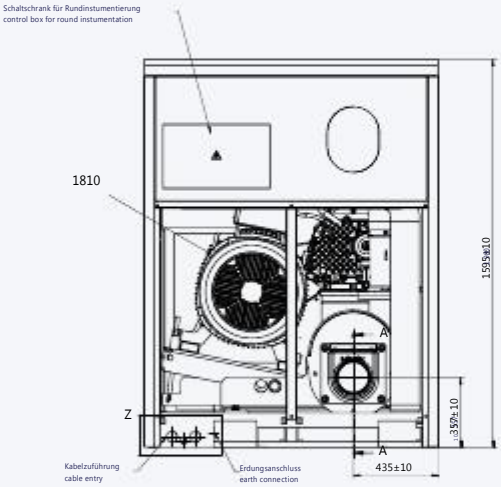
| | | |
|---|---|---|
| 2410 | Riemenschutz | Belt guard |
| 2710 | Elast. Rohrverbindung DS | Flex. pipe connection |
| 2720 | Elast. Rohrverbindung DS -Zubehör- | Flex. pipe connection DS -optional- |
| 3410 | Filterschalldämpfer | Filter silencer |
| 3470 | Ansaugfilter | Intake filter |
| 4420 | Sicherheitsventil | Safety valve |
| 5310 | Anfahrentlastung -Option- | Start unloading device -optional- |
| 6510 | Wartungsanzeiger | Service indicator |
| 6520 | Manometer | Pressure gauge |
| 6550 | Öldrucküberwachung | Oil pressure control |
| 6580 | AERZEN Steuerung -Option- | AERZEN control -optional- |

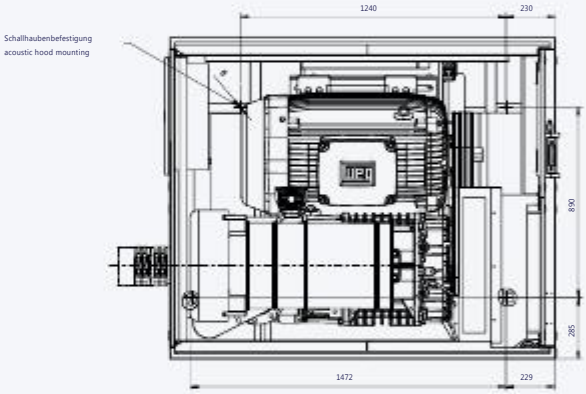
*Drawing no.: 4900104391*

# DELTA HYBRID D 52 S



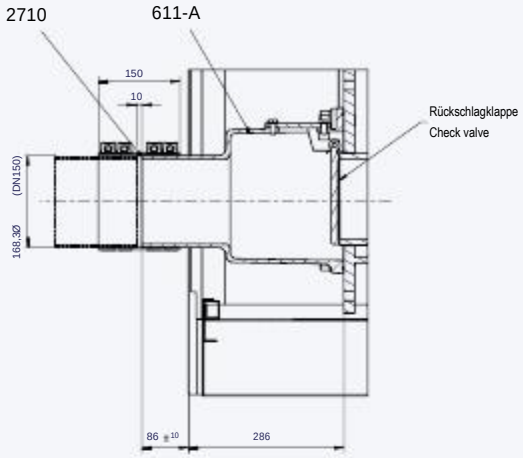



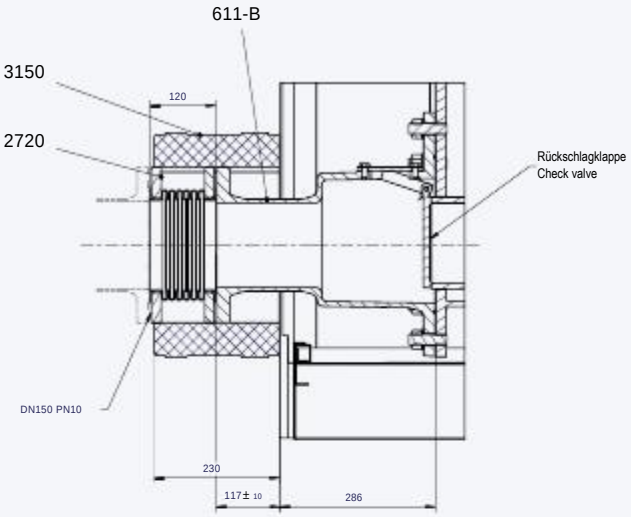



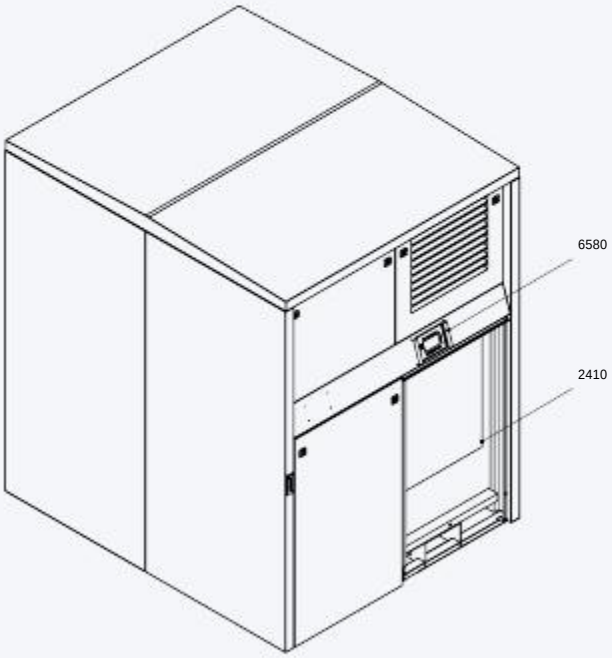

| Pos. | Benennung | Description |
|---|---|---|
| 100 | Drehkolbenverdichter | Rotary lobe compressor |
| 610 | Grundträger | Base support |
| 611-B | Anschlussgehäuse mit Flansch -Option- | Connection housing with flange -optional- |
| 611-A | Anschlussgehäuse für Muffe | Connection housing for sleeve |
| 1210 | Ölnebelabscheider | Oil demister |
| 1810 | Motor | Motor |
| 1820 | Motorbefestigung | Motor fastening |
| 2110 | Riementrieb | Belt drive |
| 2410 | Riemenschutz -Option- | Belt guard -optional |
| 2710 | Elast. Rohrverbindung DS -Muffe- | Flex. pipe connection DS -sleeve- |
| 2720 | Elast. Rohrverbindung DS-Kompensator- Option | Flex. pipe connection DS -compensator -option- |

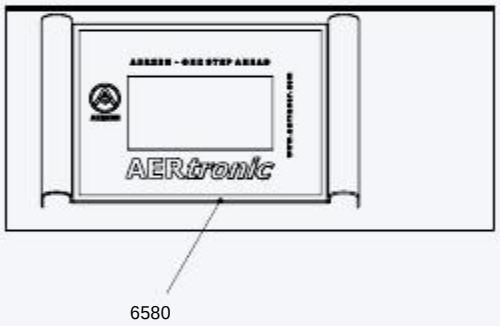
| | | |
|---|---|---|
| 3150 | Schallschluckmatte -Option- | Absorption mat |
| 3410 | Filterschalldämpfer | Filter silencer |
| 3450 | Elastische Rohrverbindung SS -Option- | Flexible pipe connection SS -optional- |
| 3451 | Ansaugtopf | Suction pot |
| 4420 | Sicherheitsventil | Safety valve |
| 6410 | Ölsystem | Oil system |
| 6510 | Wartungsanzeiger | Service indicator |
| 6520 | Manometer | Pressure gauge |
| 6550 | Manometer Öldruck | Pressure gauge oil pressure |
| 6580 | AERZEN Steuerung AERtronic -Option- | AERZEN control unit AERtronic -optional- |
| 7110 | Schallhaube | Acoustic hood |
| 7220 | Axialventilator | Axial fan |
| 7240 | Abdeckblech -Option- | Cover plate -optional- |

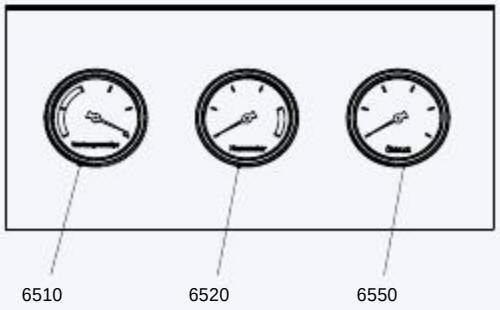
*Drawing no.: 4000216343*


2710
611-A
150
10
(DN150)
168,3
Rückschlagklappe
Check valve
86 ±10
286

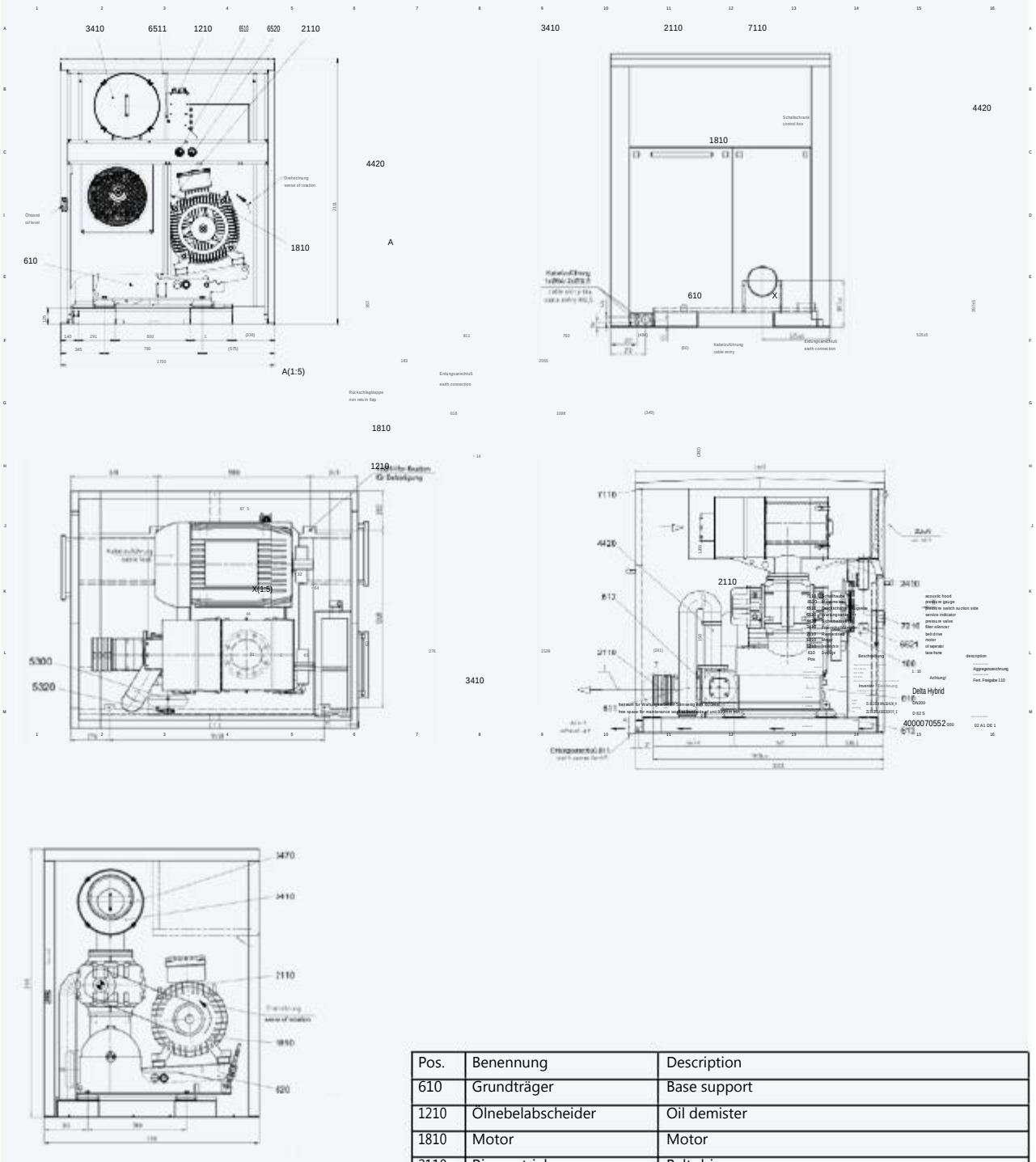

611-B
3150
2720
120
Rückschlagklappe
Check valve
DN150 PN10
230
117± 10
286


6580
2410


AERtronic
6580


6510
6520
6550

# DELTA HYBRID D 62 S/H

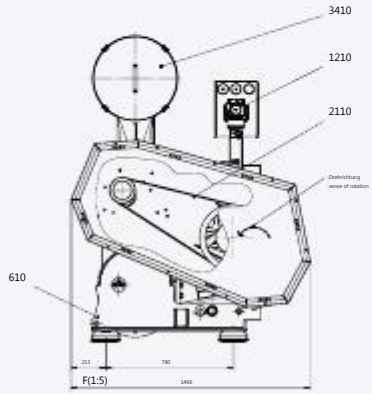


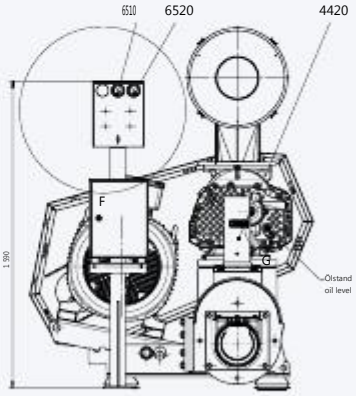


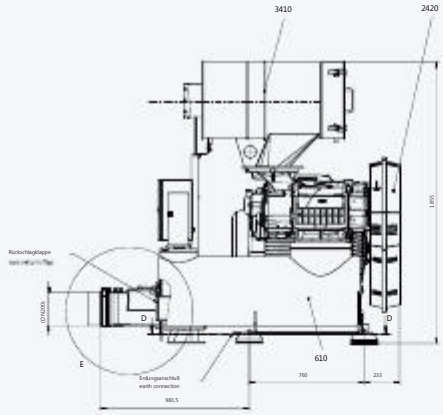


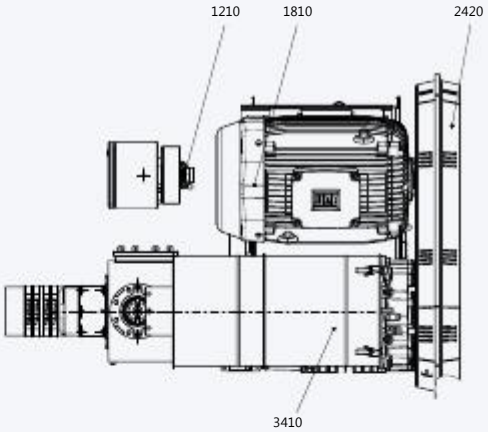
| Pos. | Benennung | Description |
|---|---|---|
| 610 | Grundträger | Base support |
| 1210 | Ölnebelabscheider | Oil demister |
| 1810 | Motor | Motor |
| 2110 | Riementrieb | Belt drive |
| 3410 | Filterschalldämpfer | Filter silencer |
| 4420 | Sicherheitsventil | Safety valve |
| 6510 | Wartungsanzeiger | Service indicator |
| 6511 | Druckschalter Saugseite | Pressure switch suction side |
| 6520 | Manometer | Pressure gauge |
| 7110 | Schallhaube | Acoustic hood |

*Drawing no.: 4000070552*



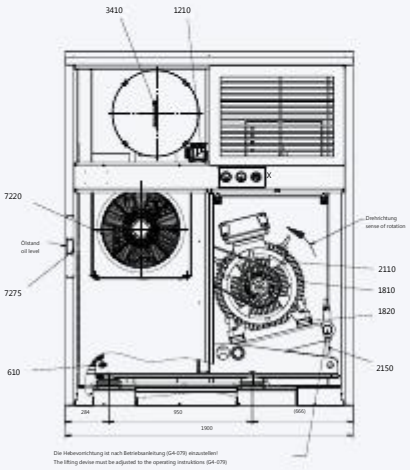



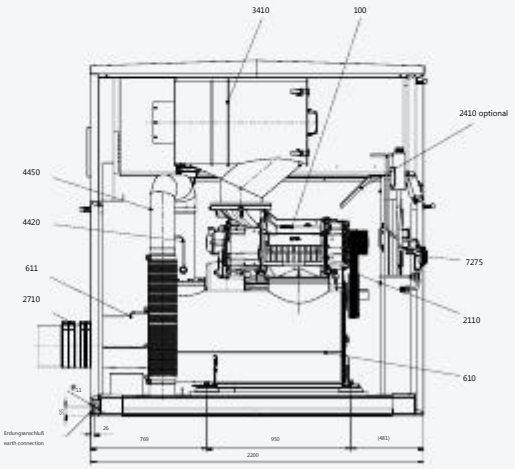



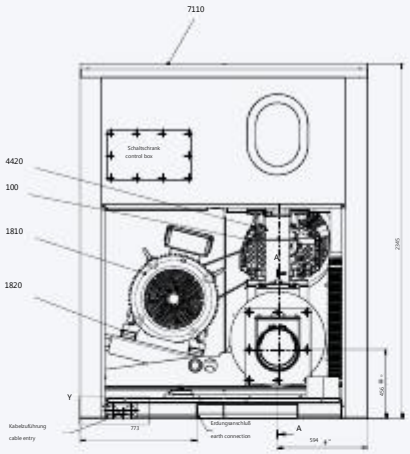

| Pos. | Benennung | Description |
|---|---|---|
| 610 | Grundträger | Base support |
| 1210 | Ölnebelabscheider | Oil demister |
| 1810 | Motor | Motor |
| 2110 | Riementrieb | Belt drive |
| 2420 | Riemenschutz | Belt guard |
| 3410 | Filterschalldämpfer | Filter silencer |
| 4420 | Sicherheitsventil | Safety valve |
| 6510 | Wartungsanzeiger | Service indicator |
| 6520 | Manometer | Pressure gauge |

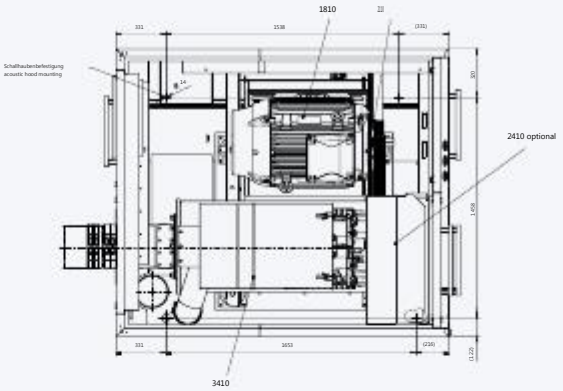
*Drawing no.: 4000108051*

# DELTA HYBRID D 75 L



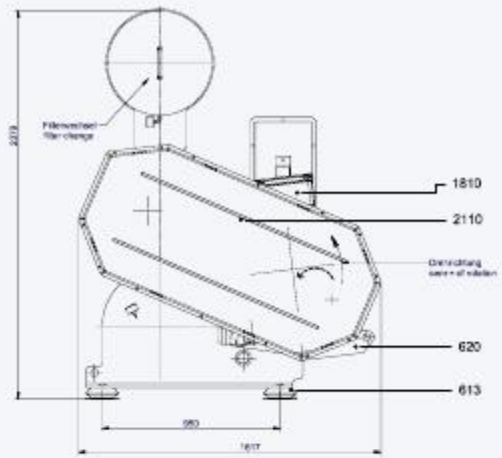



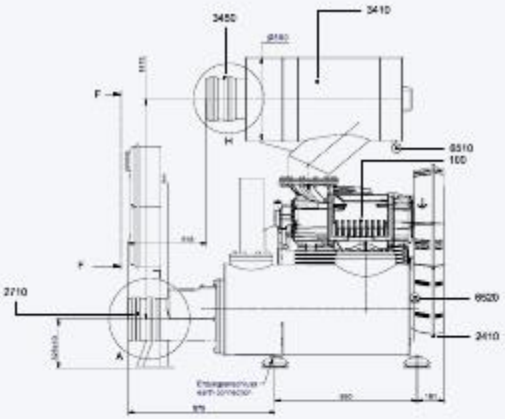



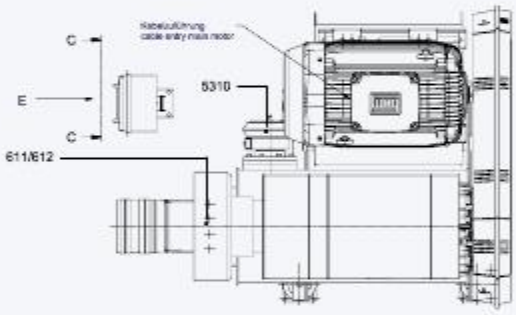

| Pos. | Benennung | Description |
|---|---|---|
| 100 | Drehkolbenverdichter | Rotary lobe compressor |
| 610 | Grundträger | Base support |
| 611 | Anschlussgehäuse für Muffe | Connection housing for sleeve |
| 611 | Anschlussgehäuse mit Flansch | Connection housing with flange |
| 1210 | Ölnebelabscheider | Oil mist demister |
| 1810 | Motor | Motor |
| 1820 | Motorbefestigung | Motor fastening |
| 2110 | Riementrieb | Belt drive |
| 2150 | Hebevorrichtung | Lifting device |
| 2410 | Riemenschutz -option- | Belt guard -optional- |
| 2710 | Elastische Rohrverbindung DS (Muffe) | Flexible pipe connection DS (sleeve) |
| 2720 | Elastische Rohrverbindung DS (Kompensator) -Option- | Flexible pipe connection DS (compensator) -optional- |

| | | |
|---|---|---|
| 3410 | Filterschalldämpfer | filter silencer |
| 3450 | Elastische Rohrverbindung SS (Muffe) -Option- | flexible pipe connection SS (sleeve) -optional- |
| 4420 | Ventil | Valve |
| 4450 | Rohrverbindung für Ventil | Pipe connection for valve |
| 5310 | Anfahrentlastung -Option- | Start unloading device (soft start) -optional- |
| 6510 | Wartungsanzeiger | Service indicator |
| 6520 | Manometer | Pressure gauge |
| 6530 | Thermometer -Option- | Thermometer -optional- |
| 6580 | AERZEN Steuerung (AERtronik) -Option- | AERZEN control unit (AERtronic) -optional- |
| 7110 | Schallhaube | Acoustic hood |
| 7220 | Axialventilator | Axial fan |
| 7240 | Abdeckblech -Option- | Cover plate -optional- |
| 7275 | Ölstandanzeiger | Oil level indicator |

*Drawing no.: 4000124319*



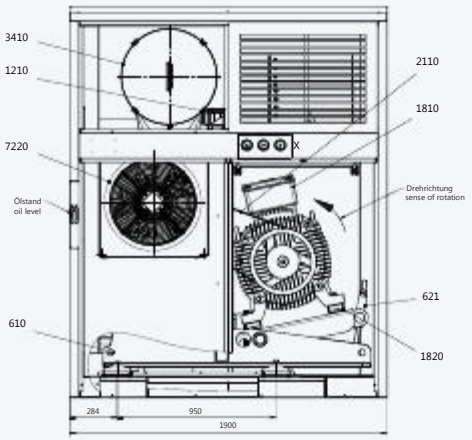



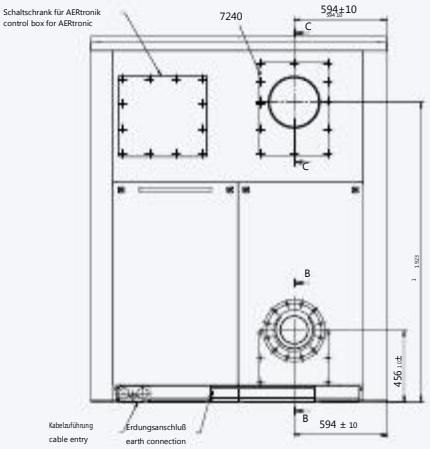



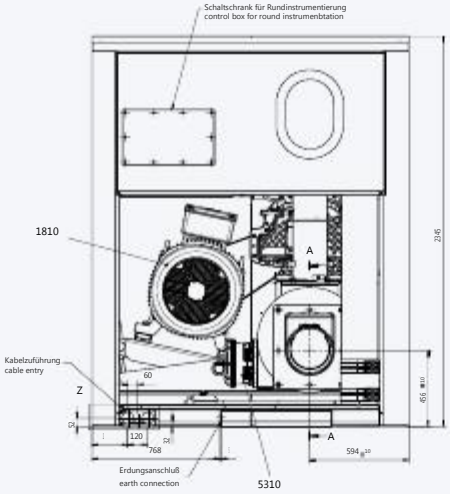

| Pos. | Benennung | Description |
|---|---|---|
| 100 | Gebläsestufe | Blower stage |
| 610 | Grundträger | Base support |
| 611 | Anschlussgehäuse | Connection housing |
| 613 | Elastischer Maschinenfuß | Flex. machinery mounting |
| 620 | Motorwippe | Hinged motor mounting plate |
| 1810 | Motor | Motor |
| 2410 | Handschutz | Hand guard |
| 2420 | Riemenschutz | Belt guard |
| 2710 | Elast. Rohrverbindung DS | Flex. pipe connection |
| 3410 | Filterschalldämpfer | Filter silencer |
| 3450 | Elast. Rohrverbindung SS | Flex. pipe connection SS |
| 4420 | Sicherheitsventil | Safety valve |
| 5310 | Anfahrentlastung -Option- | Start unloading device -optional- |
| 6510 | Wartungsanzeiger | Service indicator |
| 6520 | Manometer | Pressure gauge |
| 6580 | AERZEN Steuerung -Option- | AERZEN control -optional- |

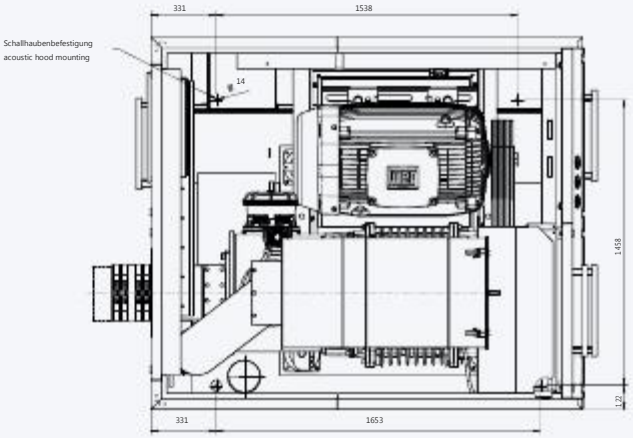
*Drawing no.: 4900104081 und 4900104076*

# DELTA HYBRID D 98 S/H



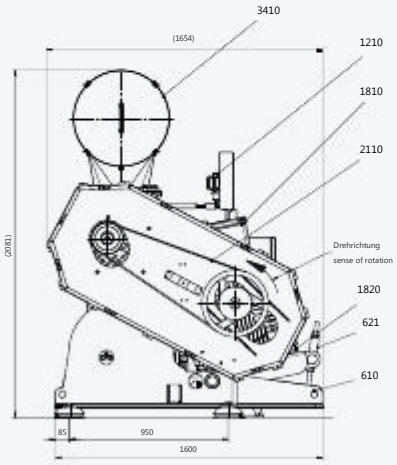



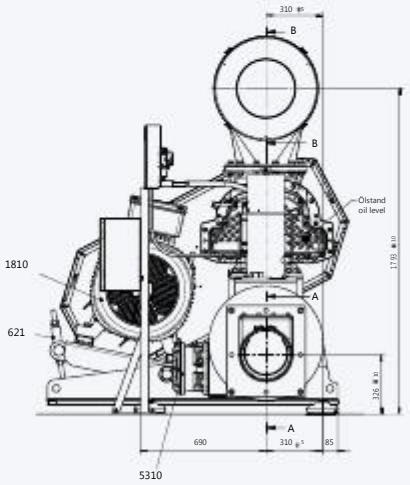



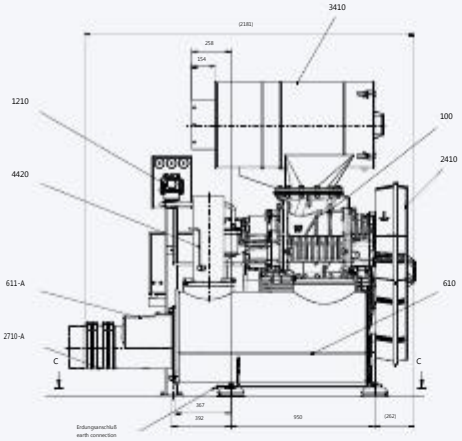

| Pos. | Benennung | Description |
|---|---|---|
| 100 | Drehkolbenverdichter | Rotary lobe compressor |
| 610 | Grundträger | Base support |
| 611-A | Anschlussgehäuse für Muffe | Connection housing for sleeve |
| 611-B | Anschlussgehäuse mit Flansch -Option für D98S- | Connection housing with flange -optional for D98S611- |
| 621 | Halter für Motorwippe | Holder for motor mounting plate |
| 1210 | Ölnebelabscheider | Oil demister |
| 1810 | Motor | Motor |
| 1820 | Motorbefestigung | Motor fastening |
| 2110 | Riementrieb | Belt drive |
| 2410 | Riemenschutz -Option- | Belt guard -optional- |
| 2710 | Rohranschluss DS mit Muffe | Pipe connection DS with sleeve |
| 2720 | Rohranschluss DS mit Kompensator -Option für D98S- | pipe connection with compensator -optional for D98S- |

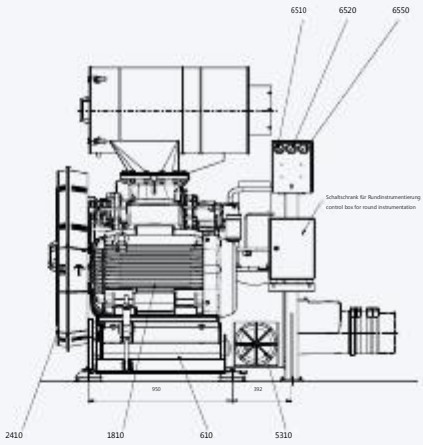
| | | |
|---|---|---|
| 3410 | Filterschalldämpfer | Filter silencer |
| 3450 | Rohranschluss SS mit Muffe -Option- | Pipe connection SS with sleeve -optional- |
| 4420 | Sicherheitsventil | Safety valve |
| 4450 | Rohranschluss für Sicherheitsventil | Pipe connection for safety valve |
| 5310 | Anfahrentlastung -Option- | Start unloading device -optional |
| 6510 | Wartungsanzeiger | Service indicator |
| 6520 | Manometer | Pressure gauge |
| 6550 | Manometer Oldruck | Oil pressure gauge |
| 6580 | Elektronische Steuerung (AERtronic) -Option für D98 S- | Electronic control (AERtronic) -optional for D98S- |
| 7110 | Schallhaube | Acoustic hood |
| 7220 | Axialventilator | Axial fan |
| 7240 | Abdeckblech -Option- | Cover plate -optional- |
| 7275 | Ölsystem | Oil system |

*Drawing no.: 4000065958*



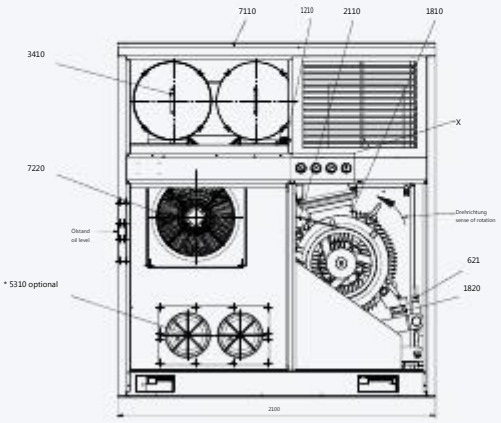



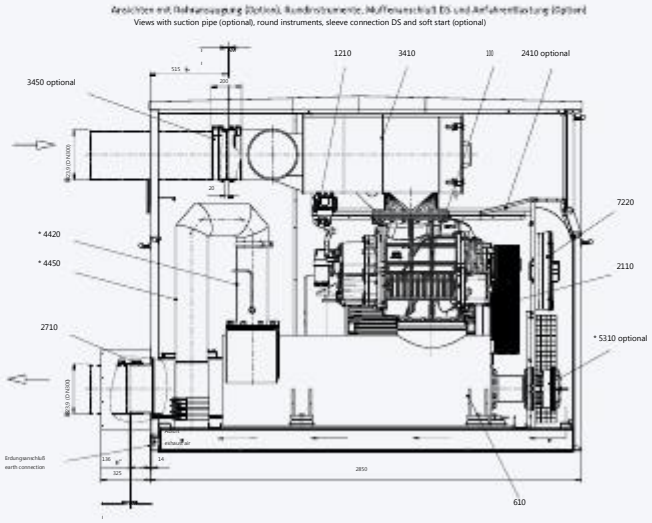



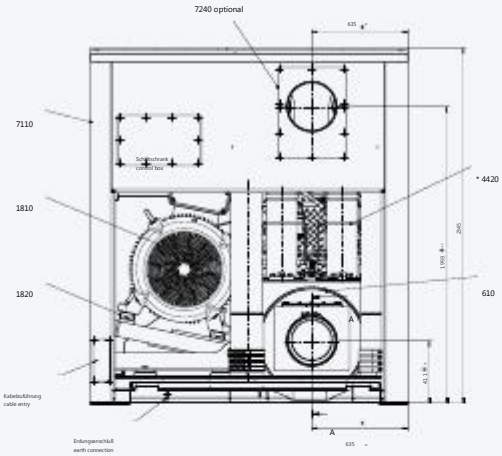

| Pos. | Benennung | Description |
|---|---|---|
| 100 | Drehkolbenverdichter | Rotary lobe compressor |
| 610 | Grundträger | Base support |
| 611-A | Anschlussgehäuse für Muffe | Connection housing for sleeve |
| 611-B | Anschlussgehäuse mit Flansch -Option für D98S- | Connection housing with flange -optional for D98S611- |
| 621 | Halter für Motorwippe | Holder for motor mounting plate |
| 1210 | Ölnebelabscheider | Oil demister |
| 1810 | Motor | Motor |
| 1820 | Motorbefestigung | Motor fastening |
| 2110 | Riementrieb | Belt drive |
| 2420 | Riemenschutz | Belt guard |
| 2710-A | Rohrverbindung DS mit Muffe | Pipe connection DS with sleeve |
| 2710-B | Rohrverbindung DS mit Kompensator -Option für D98S- | Pipe connection DS with compensator -optional for D98S- |
| 3410 | Filterschalldämpfer | Filter silencer |
| 3450 | Rohranschluss SS -Option- | Pipe connection SS -optional |
| 4420 | Sicherheitsventil | Safety valve |
| 5310 | Anfahrentlastung -Option- | Start unloading device -optional |
| 6510 | Wartungsanzeiger | Service indicator |
| 6520 | Manometer | Pressure gauge |
| 6550 | Öldruckmanometer | Oil pressure gauge |
| 6580 | Elektronische Steuerung (AERtronic) -Option für D98S- | Electronic control (AERtronic) -optional for D98S |

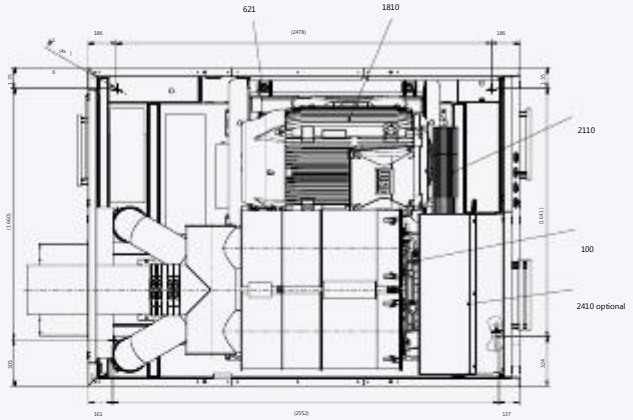
*Drawing no.: 4000062755*

# DELTA HYBRID D 152 S/H



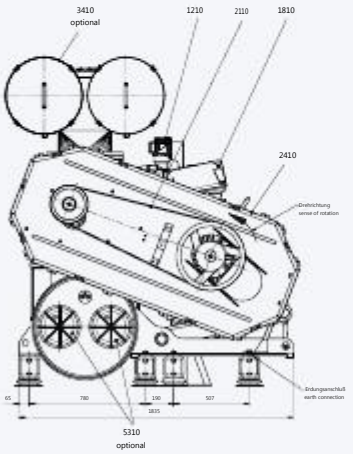



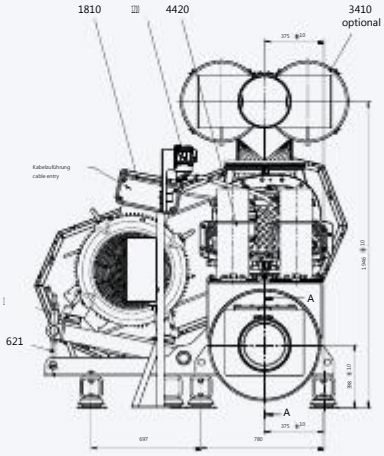



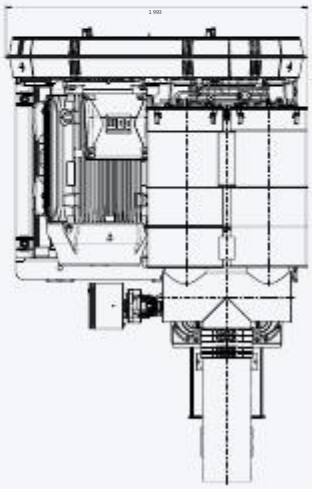

| Pos. | Benennung | Description |
|---|---|---|
| 100 | Drehkolbenverdichter | Rotary lobe compressor |
| 610 | Grundträger für Muffenanschluss | Base support for sleeve connection |
| 610 | Grundträger für Flanschanschluss -Option- | Base support for flange connection |
| 621 | Halter für Motorwippe | Holder for motor mounting plate |
| 1210 | Ölnebelabscheider | Oil demister |
| 1810 | Motor | Motor |
| 1820 | Motorbefestigung | Motor fastening |
| 2110 | Riementrieb | Belt drive |
| 2410 | Riemenschutz -Option- | Belt guard -optional- |
| 2710 | Elastische Rohrverbindung DS -Muffe- | flexible pipe connection DS -sleeve- |
| 2710 | Elastische Rohrverbindung DS -Kompensator- | flexible pipe connection DS -compensator- |

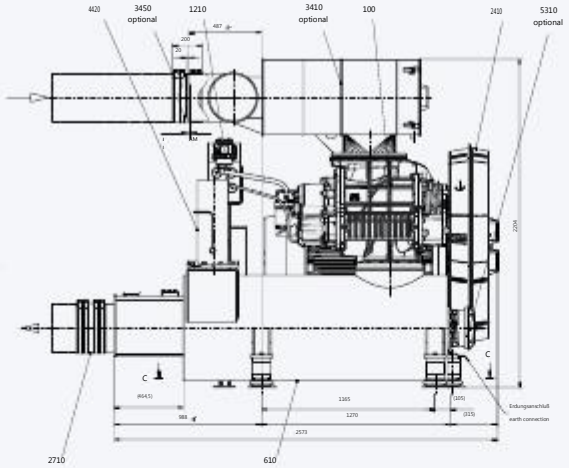
| | | |
|---|---|---|
| 3410 | Filterschalldämpfer | Filter silencer |
| 3450 | Elastische Rohrverbindung SS -Muffe- -Option- | flexible pipe connection SS -sleeve- -optional- |
| 4420 | Druckventil | Pressure valve |
| 4450 | Rohverbindung für Druckventil | Pipe connection for pressure valve |
| 5310 | Anfahrentlastung -Option- | Start unloading device -optional |
| 6510 | Wartungsanzeiger | Service indicator |
| 6520 | Manometer Enddruck | Pressure gauge |
| 6530 | Thermometer -Option- | Thermometer -optional- |
| 6550 | Manometer Öldruck | Oil pressure gauge |
| 6580 | Elektronische Steuerung (AERtronic) -Option | Electronic control (AERtronic) -optional for D98S- |
| 7110 | Schallhaube | Acoustic hood |
| 7220 | Axialventilator | Axial fan |
| 7240 | Abdeckblech -Option- | cover plate -optional- |

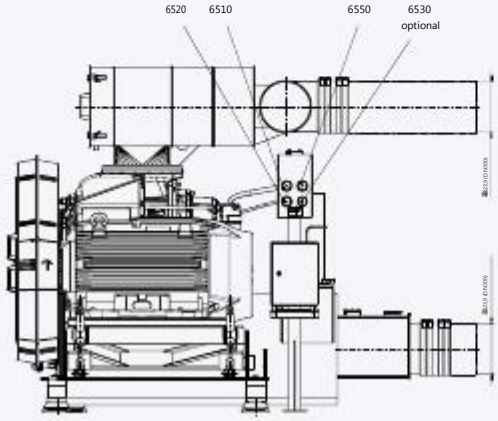
*Drawing no.: 4000115440_01*






| Pos. | Benennung | Description |
|---|---|---|
| 100 | Drehkolbenverdichter | Rotary lobe compressor |
| 610 | Grundträger für Muffenanschluss | Base support for sleeve connection |
| 610 | Grundträger mit Flanschanschluss -Option- | Base support for flange connection -optional- |
| 621 | Halter für Motorwippe | Holder for motor mounting plate |
| 1210 | Ölnebelabscheider | Oil separator |
| 1810 | Motor | Motor |
| 1820 | Motorbefestigung | Motor fastening |
| 2110 | Riementrieb | Belt drive |
| 2410 | Riemenschutz | Belt guard |
| 2710 | Elastische Rohrverbindung DS -Muffe- | Flex. pipe connection DS -sleeve- |
| 2710 | Elastische Rohrverbindung DS -Kompensator- -Option- | Flex. pipe connection DS -compensator -optional- |
| 3410 | Filterschalldämpfer für Raumansaugung | Filter silencer for room suction |
| 3410 | Filterschalldämpfer für Rohransaugung -Option- | Filter silencer for pipe suction -optional- |
| 3450 | Elastische Rohrverbindung SS -Option- | Flexible pipe connection SS -sleeve- -optional- |
| 4420 | Druckventil | Pressure valve |
| 5310 | Anfahrentlastung -Option- | Start unloading device (soft start) -optional- |
| 6510 | Wartungsanzeiger | Service indicator |
| 6520 | Manometer | Pressure gauge |
| 6530 | Thermometer -Option- | Thermometer -optional- |
| 6550 | Manometer Öldruck | Pressure gauge for oil pressure |
| 6580 | AERZEN Steuerung -AERtronik- -Option- | AERZEN control unit -AERtronic -optional- |

*Drawing no.: 4000105405*

# **TURBO BLOWER.**
# AERZEN TURBO.

**The AERZEN turbo blower is Aerzen's newest machine technology and a particularly efficient, compact and low -maintenance turbo machine. The experiences in the turbo sector reach back to 1911. Aerzener Maschinenfabrik was constructing and distributing the first turbo blowers at this time already.**

Even then, the blower stage based on the principle of a radial compressor was identical with today's modern turbo blowers. However, over time, the size and drive technology have changed significantly. Due to these developments, today's speed-regulated units are significantly more compact, more efficient and almost maintenance-free.

Aerzener Maschinenfabrik have developed their new range AT turbo blower generation 5 specifically for the requirements in biological communal and industrial wastewater treatment plants. The AERZEN turbo blowers operate with high-speed permanent magnet motors and can be smoothly adjusted to fluctuating process air requirements between 40% and 100% without the need for any mechanic adjusters.

Versatility in numbers
· Intake volume flows from 110 $m^3$/h to 9.000 $m^3$/h
· Regulation range from 40 to 100%
· overpressures up to 1,000 mbar
· Nominal sizes DN 100 to DN 300

Applications
· Wastewater cleaning
· Ventilation of rivers and lakes and much more

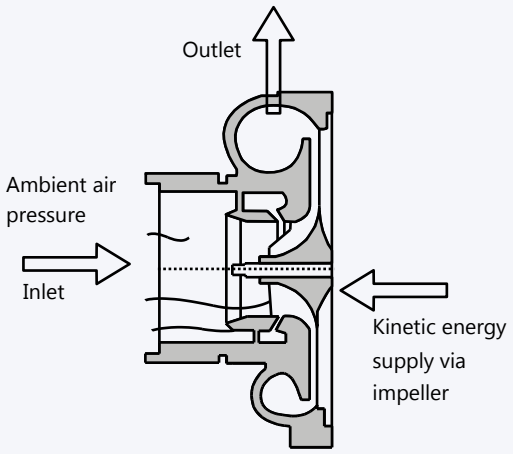
Your advantages
· Exceptional energy efficiency
· Reduced life cycle costs
· High reliability and longevity
· Minimal maintenance

Frequency converters and line reactor are integrated into the systems ready for connection. Compared to conventional motors, this high-speed motor is significantly more efficient. The air-cooled, compact motor is speed-regulated. It is driven via a completely oil-free, contact- and vibration-free air foil bearing. The effect: excellent efficiency, minimal maintenance effort and reduced wear.

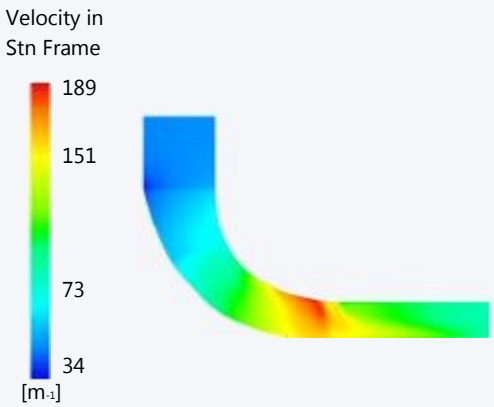
# TECHNOLOGY.

Compression principle and specific work of a radial compressor stage.
The AERZEN turbo blower is a radial compressor. Radial compressors are turbo machines. They are different from displacement units such as, e.g. positive displacement blowers and screw compressors. Flow machines compress continuously and are therefore pulsation-free. In general, the ambient air is sucked into the impeller in the axial direction and redirected through the impeller and the housing construction at an angle of 90°. This is reflected in the name of the radial compressor because the air exits in the radial direction. The impeller rotates at high speed and charges the sucked in air with kinetic energy in the form of speed. This is due to the rotation of the impeller. Here, the air is moved outwards continuously. The air escaping the impeller at high speed is slowed down by the downstream diffusor and collected in the spiral housing surrounding the impeller. Slowing down the air means that the high kinetic energy is transformed into potential energy and therefore, pressure. When slowing down the accelerated air in the diffusor, congestion occurs and the following air molecules collide with those already slowed down at high speed. This compresses the air and generates static pressure in the system. When air has been collected in the spiral housing, the air in the downstream cone diffusor is slowed down again to ensure that the remainder of the still present speed energy is transformed into potential pressure energy without much loss.

Pressure is generated by expansion and delay of the fluid in the spiral housing and the diffusor.

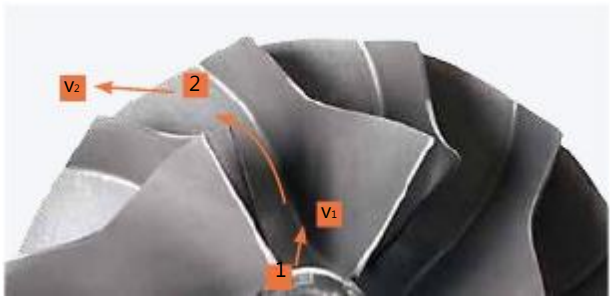


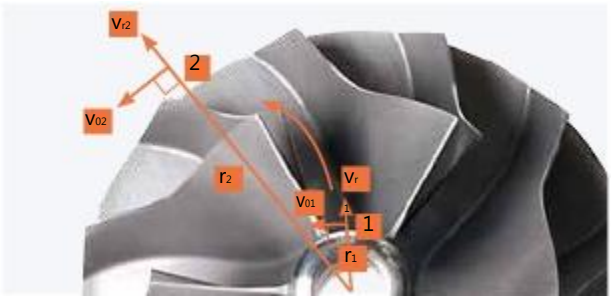

Pressure and flow volocity throughout the compressor



The operating principle is described primarily by Bernoulli's-Law and its equation $P + 0.5\ pv^2 = P0$. This means that the total energy of a system remains constant when the mass flow through a system is constant. Therefore, if the flow speed of the air in the system increases, the static pressure of the air flowing through decreases at the same time. This is also true vice versa and therefore, the total energy of the system remains the same. This principle predominantly applies in the diffusors of the turbo blower stage.
Energy is only brought into the system of the radial compressor via the impeller in the form of kinetic speed energy.

That is why the impeller plays the most important role. Its geometry can take on many shapes and can be decisive for the flow pattern in the entire blower stage. As the turbo blower is a turbo machine with very high flow speeds within the stage, a flow free of turbulences and therefore loss becomes an important parameter to achieve high isentropic stage efficiencies. The specific work of a radial compressor stage is determined by its enforced mass flow of the conveyed air and the contribution of the fed-in energy, i.e. the addition to increase the speed.

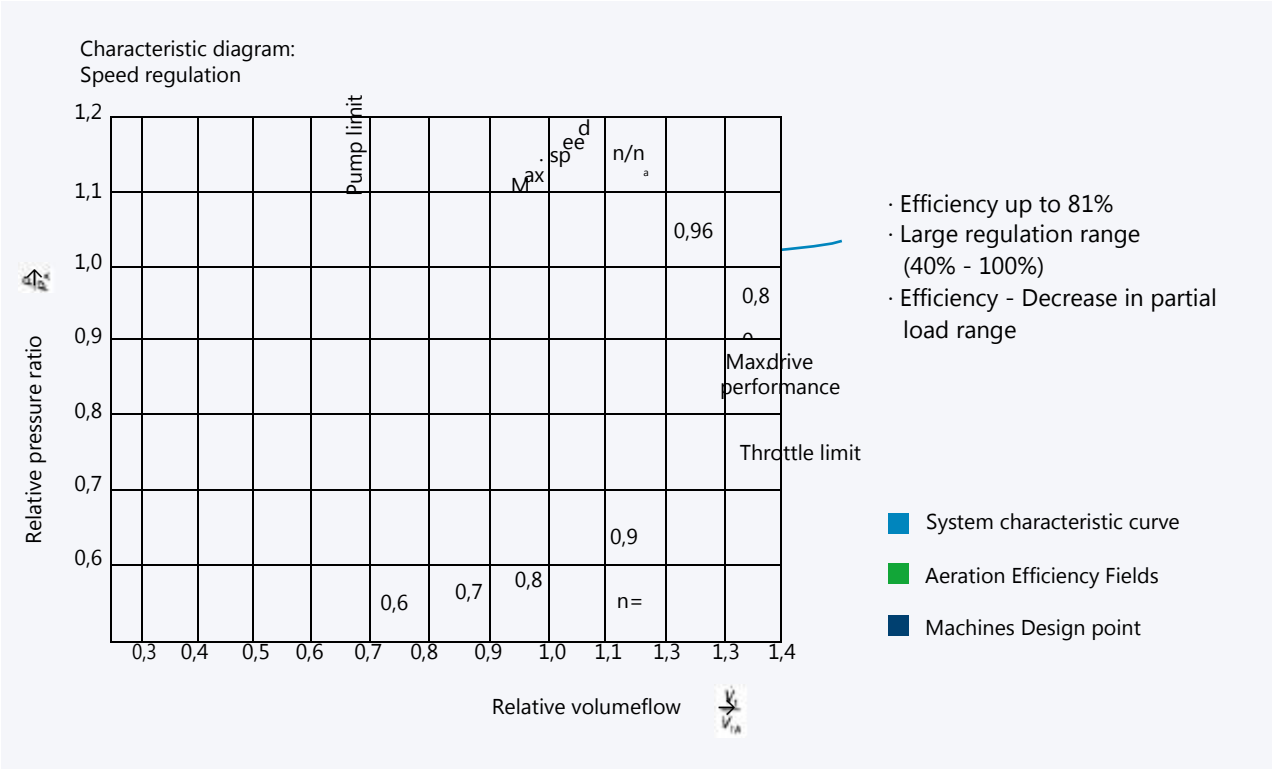



$$\text{Torque} = \dot{m}(r_2 V_{02} - r_1 V_{01})$$

This principle becomes clear through the basic formula of an impeller. Here, the torque operating on the shaft is equal to the mass flows multiplied by the ratio of the speed of the inlet impeller to the outlet impeller. I.e., the air mass/amount and the isentropic conveyor height specified by the system, or the pressure increase. These basic parameters determine the optimal basic geometry of the impeller and the housing.

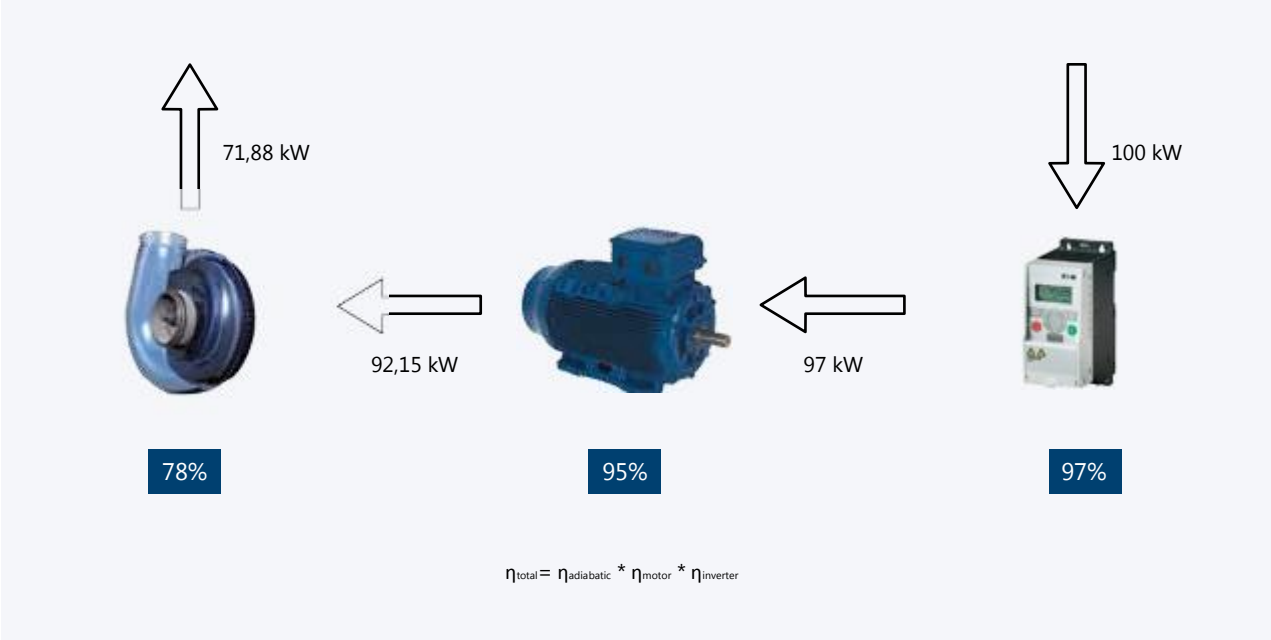
Characteristic diagram of a turbo machine




Characteristic of the turbo blower

Each turbo blower is identified by a special label which illustrates the operating area within and outside the operating limits. In most cases, the different efficiency fields are integrated as well. By illustrating the blower operating point within its label, it is immediately obvious whether the blower is operated within an economically advantageous point as well as within its physical limits. The physical blower limits are determined by the following four parameters: The pump limit defined by the minimal possible throughput, the choke limit defined by the maximum throughput, the maximum possible drive performance and the maximum speed. Within this characteristic field, the turbo blower reaches a large isentropic efficiency level particularly in the centre of the characteristic field when compared to other blower technologies. The levels of efficiency vary and are directly related to the currently conveyed volume flow and the pressure increase. Depending on the operating range of the system, the correct layout of the turbo blower is a deciding factor regarding the reliability and profitability. Operating the blower outside the characteristic field is not possible or can lead to the destruction of the machine. If the turbo blower is laid out correctly, it can reach extremely high levels of efficiency particularly for medium and high volume flows and, depending on the pressure increase, a relatively broad regulation range between pump limit and the maximum drive performance and/or choke limit. The components within the AERZEN turbo blower are all exclusively constructed for turbo applications and have no application range outside of them. The result is a turbo blower with the currently highest performance density and extremely good profitability. These characteristics can only be achieved by using directly driven radial blower stages without drives and regulation devices associated with loss as well as the field-oriented regulation of the synchronous motor. That is why every blower unit contains drive motor, frequency converter, controls and the unit components necessary for operation as standard. The constant conveying and compression of the process air without pulsation means that the strain on the noise level and vibration-sensitive locations and components is reduced.

W2P Wire to Process = Total efficiency level
Due to the amount of components already integrated, only the total efficiency level of the unit is important to the user. The total efficiency level contains all partial efficiency levels of the unit such as motor, frequency converter, motor cooling, controls and other possibly present partial efficiency levels of integrated components. Particularly when compared to other technologies which do not integrate all components required to operate the system as required as standard, it is paramount to consider the entire scope of air generators because often additional losses can occur later on due to additional components such as frequency converters, coolant pumps, fans, gears etc.



# STANDARD SCOPE OF SUPPLY.

Turbo blower stage
· Highly efficient permanent magnet synchronous motor
· Highest performance density, therefore extremely compact and high levels of performance in smallest construction sizes
· 100% oil-free operation, simple and reliable construction due to air bearing technology. The motor construction contains only a few mechanical and hydrodynamic components, complex electronic controls are not required
· only air cooling, all performance classes can be cooled by the ambience air due to the intelligent cooling air construction. Due to the clever guiding of the air, the rotor and stator are cooled at the same time
· 100% maintenance free
· Advantageous replacement concept instead of expensive repairs and new investments.
· Individual geometry of flow components, for each type, the impeller geometry is specially adapted to the defined area of application, instead of using basic impellers which would unduly reduce efficiency levels. Individual adaptation is important for housings and the other flow-carrying components as well.
· Integrated measurement of air amount, the measurement of air amount is realised in the inlet cone of the blower stage and measures the current volume flow in real time following the Venturi principle. This means that not only is the amount of air made available to the customer, the current operating point is also displayed on the blower performance range.

Cooling air turbo
The small brother of the main motor cools it as required and depending on the load point. It is a big challenge to get rid off the heat loss created in the main motor considering the extremely high performance densities in AERZEN turbo blowers. The speed and thus the cooling air throughput are varied in the cooling air turbo as well, to ensure that cooling efficient and needs-based. The basis for this is the same basic technology as for the main motor. Another advantage of the external cooling air turbo is the use of warm cooling air to regain heat. The waste heat can be used specifically and moved where it is needed. To heat operating rooms etc.

· External cooling air turbo with air bearing and speed regulation for efficient cooling of the main motor
· The cooling air throughput does not depend on the main motor speed any more and can be adjusted individually.
· The warm exhaust air can be used cleverly, e.g. to heat rooms

Frequency converter
The frequency converter is directly integrated into the packaged unit and is equipped with frequency converter technology specifically adapted to turbo applications. All multifunctional abilities and parameters which are used for standard frequency converters are not utilised here on purpose. The advantages are more capacity and flexibility for turbo-specific functions and an improved efficiency. For example, the special motor torque acquisition compensates pressure increases caused by the quick variation of the blower speed and thereby prevents the premature reaching of the pump limit. The commutation of the motor winding specifically adapted to high speeds ensures that the motor coils are supplied with current variably across the entire speed range at advantageous times. This is the key for all PM/synchronous motors to ensure that lost heat is kept as low as possible and efficiency kept as high as possible. Simple air cooling for all performance classes whilst keeping to a compact design can also be realised for frequency converters. This is only possible due to the low switching frequency of the semiconductor components. This means they generate less lost heat and therefore require less cooling. The frequency converter can be pulled out like a drawer for servicing and maintenance purposes. This ensures that live measurements component inspections and a quick replacement of individual components can take place without having to replace the entire frequency converter. The frequency converter is CE- and UL-certified and already contains a RFI filter (optional, depending on region) to achieve the industry standard C2.

- Frequency converter technology exclusive to turbo applications, unnecessary functions for multi-application cases are used for turbo-specific functions.
- Extremely quick regulation behaviour/speed regulation reduces sensitivity towards fluctuating operating conditions and premature compression of pumps. (High-Rise- to-Surge)
- Simple and effective cooling of air for all performance classes
- Simplest accessibility due to pull-out drawer reduces costs and downtimes in service events
- Already integrated electric filter elements according to 2006/95/EG
- Good availability of spare parts and modular exchange concept

Aerzen Turbo control
All parameters are brought together for the central turbo control. All important limits are monitored and operation within the blower characteristic field is ensured. The real-time monitoring of all operating parameters has vital advantages and provides additional information about the system to the user which can be transmitted to the process control system via the integrated display or directly via a bus interface.

Blow-off valve
The blow-off valve necessary for the starting and stopping process as well as for too high counter pressure is controlled by the integrated controls using an electro-pneumatic valve. The valve can be opened and closed as required by the electronic controls. The blown out air is then transported through a downstream silencer. The blow-off direction can be varied by 180° as required. Thanks to the downstream silencer, the noise level is kept low even when the valve is opened.

Real-time monitoring of operating data
· Extremely fast data processing and reaction time due to micro-controller unit specifically designed for turbo applications.
· Connection to client's process control system using various bus systems
· Description of current operating point on blower characteristic diagram
· All regulation parameters are tailored individually to the turbo application
· Direct evaluation of air amount measurement in standard, or actual cubic meters for automated operation within characteristic area limits and as an information for the user.
· Trend description and long-term logging of all essential operating data
· Automatic operation and protection of turbo blower within system limits

· Simple construction and electronically controlled solenoid valve for need-specific controls
· Moderate noise level when the valve is opened due to integrated blow-off silencers
· Additional safety functions when system limits have been exceeded

Cone diffusor
An important component of a turbo machine is the cone diffusor which helps to generate pressure. Here, the remaining speed energy is transformed into pressure almost without loss. The correct geometry plays an important role for the total efficiency and operating behaviour of the turbo blower.

- optimised and type-specific geometry based on CFD simulations
- Almost loss-free transformation of kinetic residual energy into pressure
- Has a stabilising effect and extends the operating range with optimised flow control

Process air filter
The process air filters are one of the few wear parts on the turbo blower. Due to regular checks and maintenance, simple operation and direct accessibility were of the utmost importance. To ensure sufficient filter quality, filter elements with low pressure loss and G3 filter classification are used.

- Low pressure losses due to optimised filter inserts with large surface ratios
- High filter quality with G3 classification
- Simple and direct accessibility, for quick checks and replacement of filter

Integrated intake silencer

- Significant reduction of suction noises due to silencer baffles
- Almost loss-free soundproofing due to design advantageous for the flow
- Space-saving and completely integrated, no additional silencer necessary on the suction side

# PERFORMANCE SPECIFICATION - OVERPRESSURE
# AERZEN TURBo BLoWER

## Pos. 1) Turbo blower unit of Generation 5

To be delivered as complete compact unit ready to be connected with all accessories required for safe operation.

Unit with CE label and documentation, conforms with regulations of the following guidelines:
· Machinery Directive2006/42/EC
· EMC interference immunity according to EN50082-2; EN61800-3
· EMC emission according to EN50081-2 (Industry)
· Protective regulations of the Low Voltage Directive in accordance with Appendix I, No. 1.5.1 2006/95/EC
· Pressure Equipment Directive97/23/EC
· EMC / Electromagnetic compatibility 2004/108/EC

The following standards are complied with:
· DIN EN ISo 12100 - Safety of machines 03-2011
· DIN EN 1012-1 - Compressors and vacuum pumps 02-2011

| | |
|---|---|
| Make: | Aerzener Maschinenfabrik |
| Type: | Aerzen Turbo Generation 5 |

Machine technology in general
Turbo blower units for ventilation of biological treatment in wastewater treatment plants. Turbo blowers suitable for the smooth air volume control by regulating the impeller speed, for constant and sliding pressure control, or direct oxygen control in the tank by directly connecting an oxygen probe.

Description of blower unit
Turbo blowers for completely oil-free conveying and compression of air, performance-optimised flow machine with minimal flow loss, design dependent on output.

*as* "single blower unit"
with integrated spiral casing and separate cooling air blower type AT 150-0.6 to AT 200-1.0. (Apart from ranges AT 50 to AT 100, as well as AT 150-1.0, cooling air impeller is mounted on motor shaft).

*or as* "double blower unit"
– (one impeller for each shaft end) each with integrated spiral casing,
Type AT 200-0.6T, AT 300-0.6T-AT 400-1.0 and separate cooling air blower.

Design
· Spiral casing made of aluminium pressure casting
· Shafts and impellers statically and dynamically balanced
· Shaft, impeller and motor housing made of stainless steel
· The blower unit consists of impeller and spiral casing which is directly flanged onto the motor housing. The blower impeller is mounted directly onto the drive shaft of the motor. Shaft seal between blower unit and motor housing via labyrinth seal.
· Mounting of shaft axially and radially via oil-free air film bearing with Teflon coating and spring film.
· Cooling of drive motor occurs via separate cooling air blower, apart from type AT150-1.0, design fan mounted onto shaft.

Materials

| | |
|---|---|
| · Impeller: | Stainless steel X5CrNiCuNb16-4 |
| · Spiral casing: | Aluminium pressure casting |
| · Motor housing: | Stainless steel 1.4547 |
| · Bearing: | Stainless steel/Teflon |
| · Motor shaft: | Stainless steel alloy (Inconel) |

Description of the packaged unit

· The blower unit is mounted vertically onto the base plate of the packaged unit. The connection to the cone diffusor is equipped with cable clamps with rubber seal elements.
· The cone diffusor and the in-/outlet valves are directly integrated into the acoustic hood and supported by a steel construction which protects the blower unit against external loads.
· The unit works almost vibration-free thanks to the dynamic compression process.
· The housing and the cone diffusors are designed, tested and manufactured in accordance with the regulations of the Pressure Equipment Directive PED 97/23/EG.
· Supplied with CE label and relevant documentation.
· The process, cabinet filters are integrated into the packaged unit and can be changed from the front (maintenance side).
· The sucked-in air is transported through integrated silencer baffles to reduce the noise level.
· The unit is only suitable for indoor installation.
· Structure-borne and vibration-isolating installation of the unit on flexible machinery mountings.
· on tracks, easy to pull out switch cabinet with drawer system, for immediate access to all electric components to reduce repair and service times / costs.
· The main components motor, frequency converter and control unit can be replaced on site within 8 hours. Furthermore, it must be ensured that all necessary adjustments can be made on site.
· Connection of the pressure pipe via the standard accssories on the discharge side which is available as part of the delivery scope as an optional extra. The check valve and compensator with flange connection for the following connection sizes:

| DN 250: | DN 300: | DN 400: | DN 500: |
|---|---|---|---|
| AT150-0.8S | AT150-0.6S | AT300-0.8T | AT300-0.6T |
| AT150-1.0S | AT200-0.8S | AT300-1.0T | AT400-0.8T |
| AT200-1.0S | | | |

Performance data

| | | | |
|---|---|---|---|
| Conveyed medium | | | atmosph. air |
| Intake volume flow | $m^3$/min | : | ..... |
| Volume flow in standard condition | $Nm^3$/h | : | ..... |
| Intake pressure (abs.) | bar | : | ..... |
| Pressure increase | bar | : | ..... |
| Intake temperature | °C | : | ..... |
| Relative air humidity | % | : | ..... |
| Discharge temperature | °C | : | ..... |
| Motor speed | rpm | : | ..... |
| Motor shaft performance | kW | : | ..... |
| Total unit performance | kW | : | ..... |

*(Building tolerance for intake volume flow and coupling power: ± 5 %)*

## Pos. 2) Acoustic hood

Acoustic hood out of galvanised steel plate with primer, topcoat and suitable for transport with fork lift. Segment design with internal lining to reduce machine sound pressure level (max. 80 dB (A))

Sound pressure level.....dB(A) measured in free field 1m away from unit outline without radiating noises of the piping. (Tolerance ± 2 dB(A)). Sound measurements according to DIN EN ISO 2151

Coating: Manufacturer standard, colour RAL 5001, powder painting

Main operating and maintenance side: anterior front side with removable, generous segments and integrated Touchpanel
Rear front side: with removable/ pull-out segment for user-friendly accessibility to all important components

Acoustic hood designed for construction of several units directly next to each other.

Connections and periphery

· Process air suction via front of the machine from the space, or optional connection of a channel system via the machine roof (direct process air connection)
· In-/outlet valve opening below the acoustic hood, or optional connection of a channel or via an opening of the roof of the acoustic hood.
· Cooling motor exhaust air via floor of the acoustic hood, or optionally via the roof of the acoustic hood by connecting an exhaust air channel or similar
· Control panel exhaust air in machine room

Connection dimensions

| | | | |
|---|---|---|---|
| In-/outlet valve opening | via roof of acoustic hood | HxB | ..... x ..... x ..... mm |
| Cooling motor exhaust air opening | via roof of acoustic hood | HxB | ..... x ..... x ..... mm |
| Process air outlet | DN..... | | |

*Selection position:*

*· 02 - Process air suction via roof of acoustic hood H x B ..... x ..... x ..... mm*

Materials

Acoustic hood:
Galvanized steel

Base frame and support construction:
Galvanized steel

Cone diffusor:
Steel

Insulation material:
UL foam

Drive motor

The drive motor should be designed as directly driven permanent magnet synchronous motor with the lowest thermal and mechanical losses as well as thermal overload fuses. The drive motor has to achieve a minimum efficiency level of 96 % at nominal load.

Thermal Protection Class H
Thermal safety shutdown with 2 thermistors
Tipe of protection IP 51
Operating mode S1
Type of construction B5
Balancing grade G1
Motor start-up always via frequency converter

| | | |
|---|---|---|
| Nominal voltage/frequency | ...../..... | V/Hz |
| Nominal speed | ..... | rpm |
| Nominal power | ..... | KW |
| Nominal current/starting | ...../..... | A |
| Nominal / tilting moment | ...../..... | Nm |
| Weight | ..... | Kg |
| Efficiency | ..... | % |
| Power factor | ..... | cos phi |

Bearing

Air foil bearing with Teflon coating and spring foil designed as radial bearing on each shaft end and 1 x axial bearing on the side of the motor 's fixed bearing. Bearing is supported by hydrodynamic generation of air gap due to the shaft's own rotation. If the speed is low, or in the event of a standstill, Teflon coating with sliding friction is used for lubrication purposes.
Material: Stainless steel and Teflon alloy.

Impeller

Manufactured in lost wax procedure out of high-tensile stainless steel casting X5CrNiCuNb16-4. Configured and developed in 3D CAD process. Dynamically and statically balanced (Balancing grade G1).

| | | |
|---|---|---|
| 120 | Impeller diameter | ..... |
| | Number of impellers | ..... |

mm
units

In-/outlet valve

· Electronically controlled by solenoid valve and internal control, for starting/shutting down the turbo blower against external tank pressure, closing and opening times are individually parametrised and determined using the real operating point on blower characteristic diagram
· Valve conical seal using rubber membrane, spring-loaded
· Housing cast from aluminium pressure casting
· Pneumatic valve mounted to cone diffusor
· Pipeline silencer integrated to valve outlet

Motor cooling

· The drive motor of the ranges AT 150 to 400 is cooled successfully by a separate cooling air turbo blower which is adapted to the requirements of the given operating point by regulating the speed. Using this technology ensures optimal cooling with losses kept to a minimum and keeping the motor as small as possible. The cooling impeller should be mechanically decoupled from the shaft of the main motor to ensure that the cooling impeller can operate as energetically efficient as possible
· Integrated piping silencer for cooling motor exhaust air
· Cooling air blower unit: Consists of permanent magnet drive motor and blower unit directly flanged on. Continuous motor shaft, speed regulation dependent on load point of main drive motor, via frequency converter. Electric connection (400-500V 50/60 Hz)

Construction

· Spiral housing out of aluminium pressure casting
· Shafts and impellers statically and dynamically balanced (balancing grade G1)
· Shaft, impeller and motor housing made of stainless steel
· The blower unit with impeller and spiral casing which is directly flanged onto the motor housing.
The blower impeller is mounted directly onto the drive shaft of the motor. Shaft seal between blower unit and motor housing via labyrinth seal.
· Bearing of shaft axially and radially via oil-free air foil bearing consisting of spring foil package with Teflon coating.
· Frequency converter for continious control of cooling air quantity.

Control panel/frequency converter

The frequency converter and all of its performance electronics and accessories are designed in accordance with EN 1800-3/EN50082, Spark disturbance level Category C2 for industrial networks. To comply with EMV guidelines and to protect from system perturbations and / or fluctuations, an RFI filter and at least two intermediate circuit inductors should be used. The frequency converter has a minimum efficiency degree of 96 - 98% depending on the load point. The option of using an additional harmonic filter for THD values < 15% should be considered. The control panel has protection class IP 55.

· Frequency converter with excess current and thermal emergency-off, overvoltage protection at the inlet of the varistors and control of inlet phases. Monitoring of the outlet if the output performance is too high (short-circuit proof). Monitoring of intermediate circuit voltage over-/undervoltage
· Sensor-less current control of the drive, for extremely quick speed setting in the case of fluctuating operating conditions. Continuous speed/frequency control. Load-dependent regulation of inverter intermediate circuit voltage as well as outlet voltage and current (closed loop) to reach the optimum operating speed and efficiency, depending on the ambient conditions. Power panel should be designed as a high frequency application with controlled intermediate circuit voltage and adapted performance topology. Pure software solutions are not permitted.
· Drive motor and frequency converter are coordinated and parameterised for each other using the hardware and software constructions. The use outside a high frequency turbo application is not possible.
· The cooling occurs exclusively via radial fans which convey filtered air using the cooling bodies of the frequency converter.
· There must be enough room onsite to repair and check/inspect the frequency converter on location.
· The control panel is equipped with a circuit breaker to protect from overloading and short circuits. Furthermore, an Emergency-Stop implemented as a rotary switch is necessary in accordance with Machine Directive 2006/42/EG
· AERZEN High-Rise-to-Surge / active pump protection on basis motor current. Due to the extremely quick control of the DC line current and the resulting adaptation of the blower speed in just a few milliseconds, a blower pumping is actively prevented when the loads change quickly and the pressure increases. This property influences the operational safety of the process, particularly when the unit operates in combination with flow and displacement units.

| | | |
|---|---|---|
| Manufacturer: | AERZEN | |
| Type: | AT..... | |
| Voltage/Frequency: | ...../..... | V/Hz |
| Power: | ..... | KW |
| Efficiency: | ..... | % |
| Dimensions (L x W x H): | ..... x ..... x ..... | mm |

Control operation

· The integrated turbo control unit is based on a central processor unit (CPU). All in-/outlet signals are processed in real time and evaluated so that the system can react quickly when critical conditions occur. All sensors which are required for the optimal and secure operation of the turbo blower are integrated in the unit and the controls. The monitoring of operational data, control and switching off processes in case of incidents are completely automised.

· The unit is controlled via a HMI (Touchpanel) which features an intuitive menu as well as a clear and easy-to-understand illustration of display values.

· No-load operation mode to use the blower in case of multiple switching processes as well as intermitting operation. The blower is not stopped for this but sticks to the no-load operation speed whilst the start- valve remains open. The necessary power requirement to maintain the air cushion in the bearing is only 1-3 % of the maximum power requirement. The no-load operation does not have a wearing effect on the bearing and therefore, an unlimited amount of switching processes is possible.

· It must be possible to freely select manual operation, on-site operation and controls as well as remote operation at the blower using the client's super-ordinate control. Furthermore, the option to communicate using various fieldbus systems (Profibus, Modbus, etc.) as well as the connection via 4-20 mA analogue signal must be provided. Start/stop, errors, alarms and other operational messages must be ensured via the terminal block contacts.

· All in-/outlet processes and internal locks are automatically performed by the unit. The operating conditions are evaluated in real time and the operating point is automatically adapted to the present conditions.

· A volume flow measurement which is integrated in the unit must be provided to capture the current output.
It is measured by calculating the air mass flow using an inlet nozzle or aperture measurements following principles as specified in DIN 1952.

· Real pump detection to protect from unstable blower condition to reach the pump limit. State detection by using real analysis of conveying volume flow, at the inlet cone of blower unit via differential pressure procedure.

· Provision of a remote maintenance solution as an option, to access all operating/control parameters present on the display. For safety reasons, remote acknowledgements are not possible!

· Various control modes available (motor current, volume flow, discharge pressure, oxygen). The internal unit control should contain the option to select control modes freely to suit the client's individual requirements.

· The following display values and control options are to be displayed on the display:
  - Filter differential pressure, discharge pressure, volume flow, in-/outlet temperature, volume flow, operating hours, speed, power requirement.
  - Error memory with comprehensive information about the event. Saves all measured operating parameters independently. This means that a detailed error analysis can be carried out which means the error origin can be localised and thus, further measures can be reduced
  - Display of current operating point in blower performance range
  - Display/change of all blower control parameters on display
  - Current errors/warnings
  - Operation of the display with touch function
  - Warning and visualisation when all operating parameters are exceeded

Technical data packaged unit

| | |
|---|---|
| Make | ..... |
| Type of protection IP | ..... |
| Type | ..... |
| Nominal power | ..... KVA |
| Nominal current | ..... A |
| Inlet voltage | ..... V |
| Inlet frequency | ..... Hz |
| Outlet voltage | ..... V |
| Outlet frequency | ..... Hz |
| Power factor | ..... cos phi |
| Cooling medium | ..... |
| Electric Filter | ..... |
| Unit weight | ..... Kg |

Dimensions frequency converter (H x W x D) .....x.....x..... mm

Accessories

*Selection items*

· *01 - Bellow type expansion joint DN.....*
*Bellow type expansion joint with guiding pipe and length limiter, metal bellows and guiding pipe made of stainless steel 1.4541, welding neck flange out of steel black S235JR.*

· *02 - check valve*
*Material: Aluminium cast / stainless steel*
*check valve on the discharge side of the turbo blower, flange seal and mounting material*

*Selection items special accessories*

· *02 - Bellow type expansion joint with guiding pipe and length limiter, metal bellows and guiding pipe made of stainless steel 1.4541, welding neck flange made of stainless steel 1.4541*
· *03 - check valve made of stainless steel 1.4301*
· *04 - Discharge silencer for piping*
*a) Absorption discharge silencer made of black steel, version of discharge silencer in accordance with DGRL 97/23/E, flange seals and mounting materials.*
*b) Absorption discharge silencer made of stainless steel 1.4301, version of discharge silencer in accordance with DGRL 97/23/E, flange seals and mounting materials*
· *05 - Remote maintenance system Aerzen Turbo S-1200*
*Remote maintenance system AT S 1200 to monitor all operating data on the display. Furthermore, a continuous recording of data is available. Errors and alarm messages are transmitted directly to the AERZEN service if requested (Fault tracking). Therefore, shorter reaction times are kept which increases the operational safety and reduces service deployment costs.*
*The data transfer using mobile communications does not depend on connections at the installation site. Therefore, no further expensive configurations or safety-critical actions are necessary (data protection).*

# MAINTENANCE:

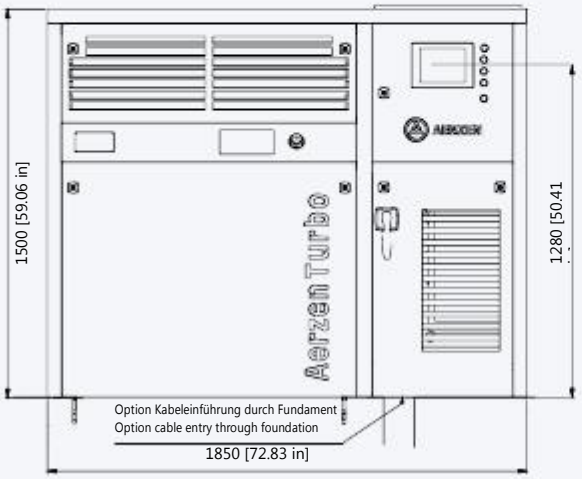
Preventative maintenance
Process air and cooling air filter replacement, monthly check of process and cooling air filter. Replacement interval according to filter differential pressure display.

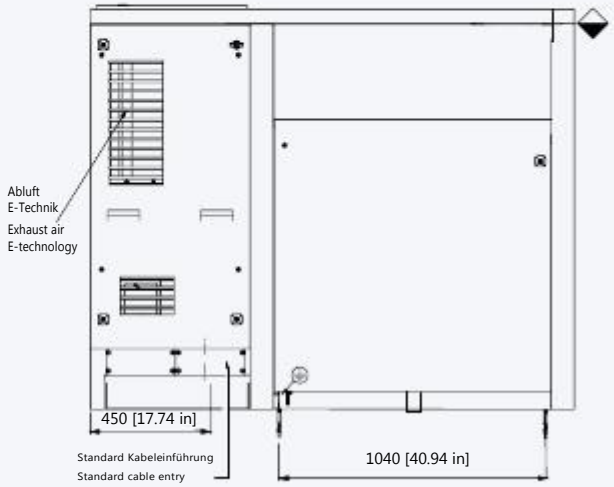
| Interval | Maintenance work | Personnal |
|---|---|---|
| Every 3 months | Filter inspection:<br>· Intake filter see Chapter 8.4.2 „Check and replace intake filter and filter bags“ on page 133)<br>· Filter bags (see Chapter 8.4.2 „Check and replace intake filter and filter bags“ on page 133)<br>· Filter element (see Chapter 8.4.3 „Check and replace filter element“ on page 135) | Service personnal |
| Annually | Clean inlet and outlet air orifice and outlet air openings (see Chapter 8.4.4 „Clean inlet and outlet air orifice and outlet air openings“ on page 137):<br>· Inlet air orifice of control panel<br>· Inlet air orifice of suction opening<br>· Rear orifice control panel<br>· Exhaust air opening of start unloading device (BOV)<br>· Exhaust air opening of cooling system | Operator |
| | EMERGENCY-STOP to be checked for function (see Chapter 8.4.5 „Check EMERGENCY-STOP button for function“ on page 138) | Authorized person |

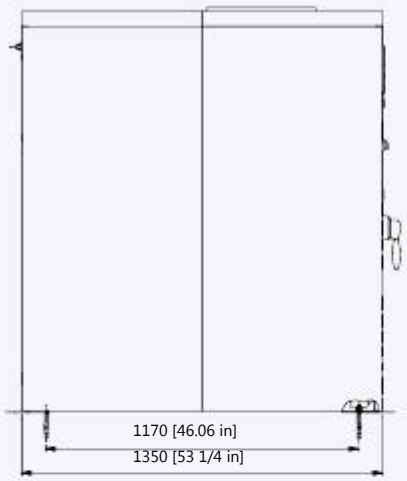
*Note: All intervals specified are manufacturer's recommendations.*

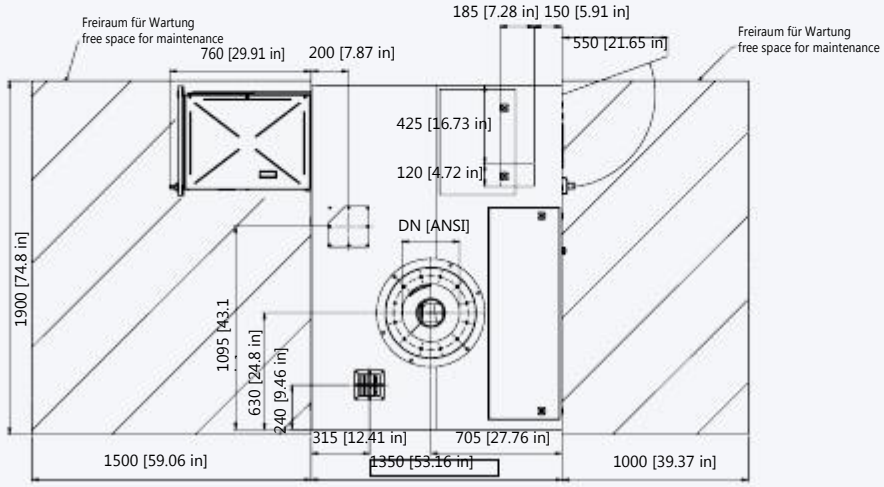
# TECHNICAL DRAWINGS.

## AERZEN TURBO AT 150 - 0.6 S



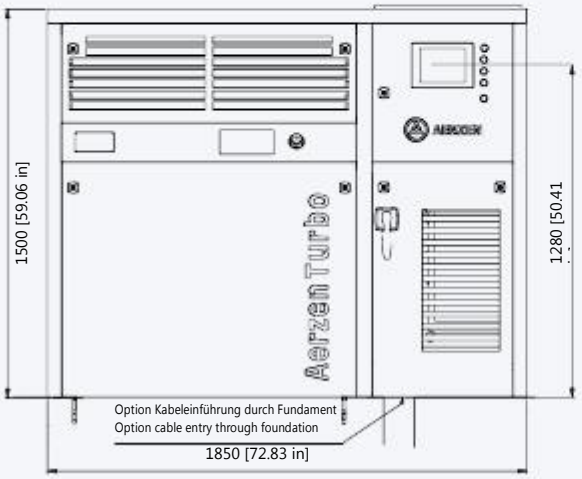



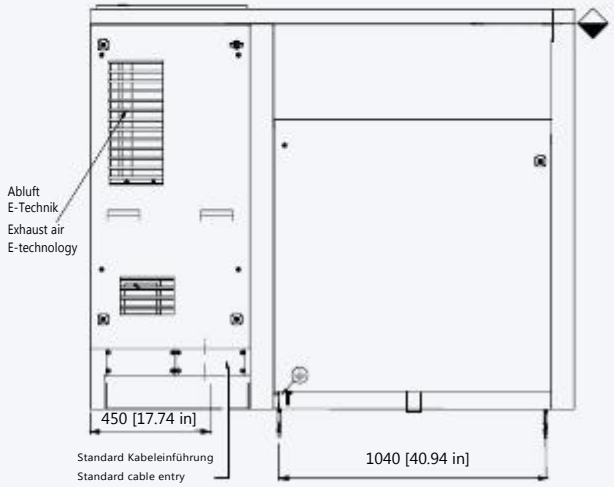



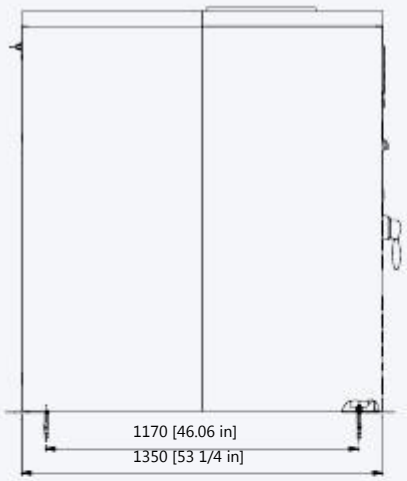



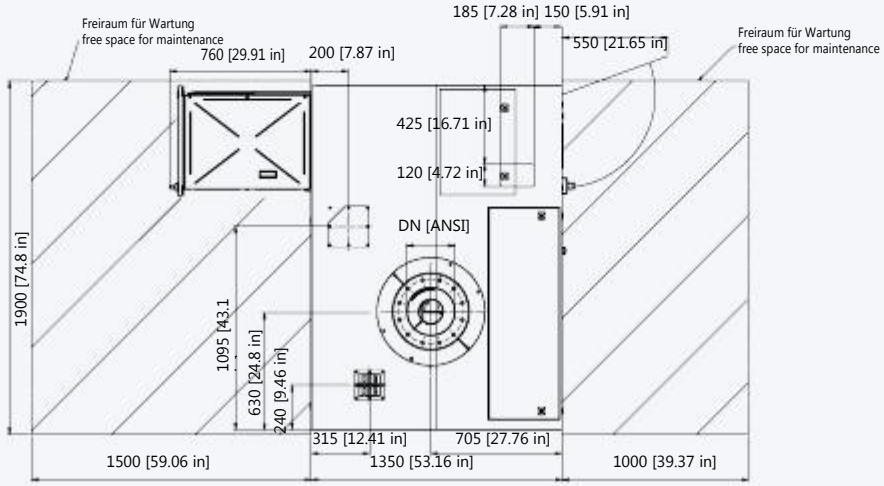

*Drawing no.: GA-900003-01*

# AERZEN TURBO AT 150 - 0.8 S



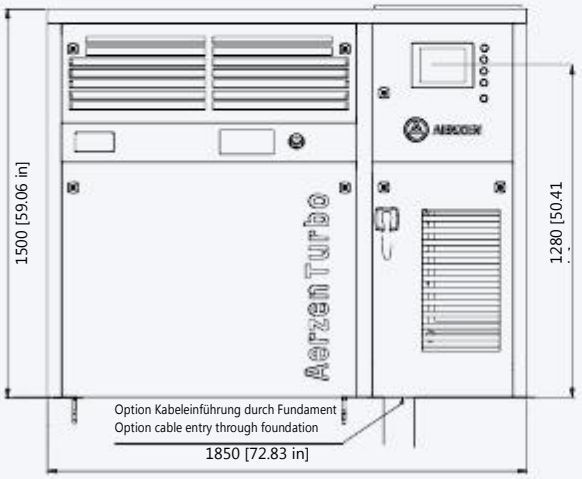



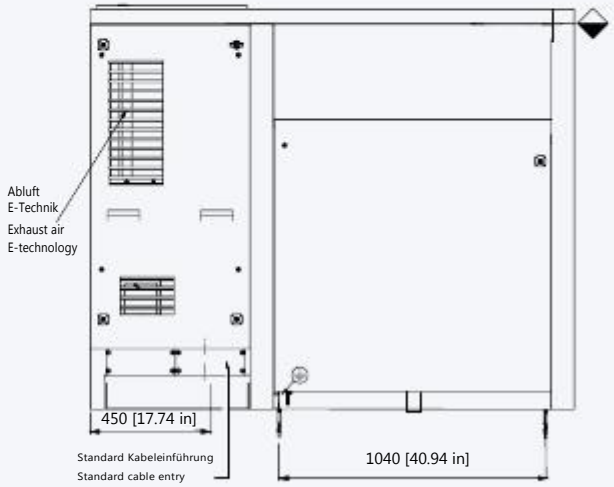



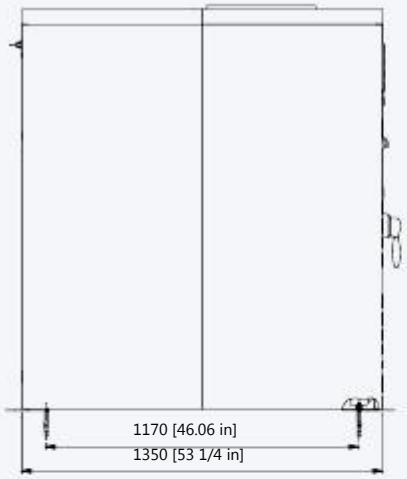



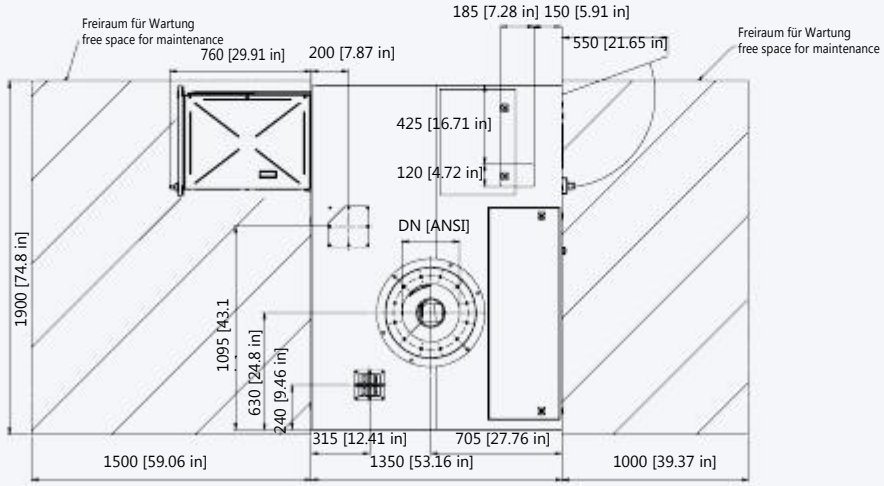

*Drawing no.: GA-900002-02*

# AERZEN TURBO AT 150 - 1.0 S



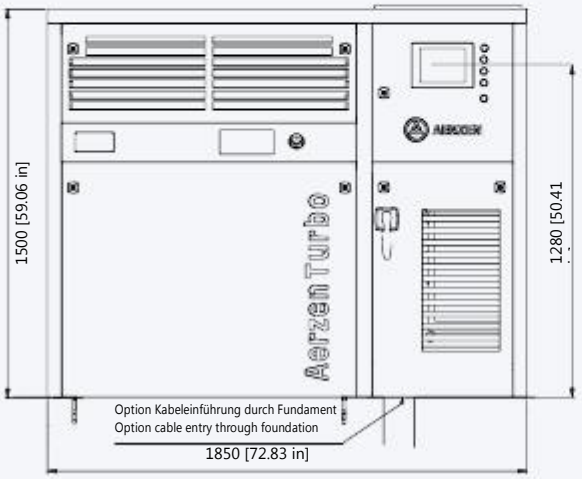



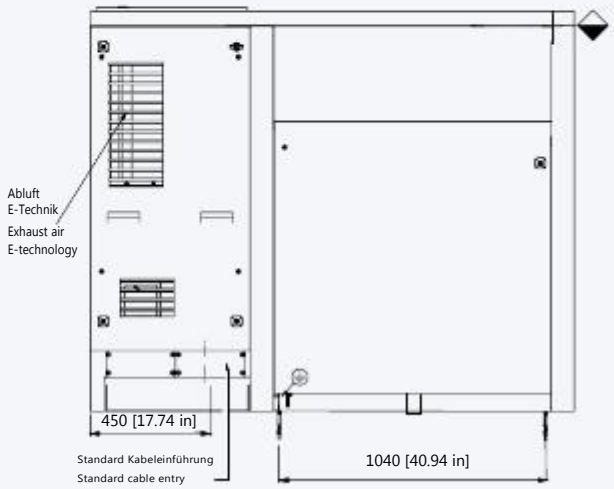



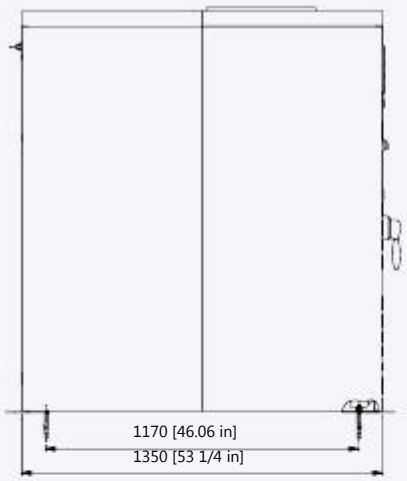



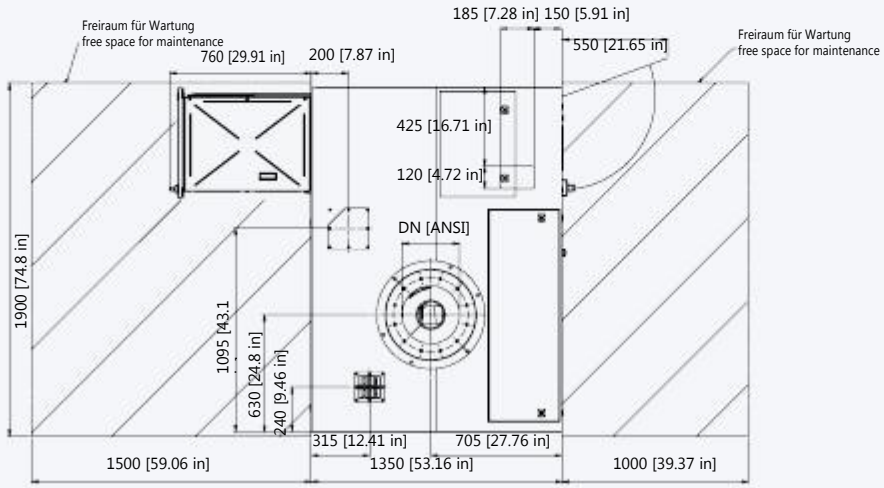

*Drawing no.: GA-900006-00*

# AERZEN TURBO AT 200 - 0.8 S

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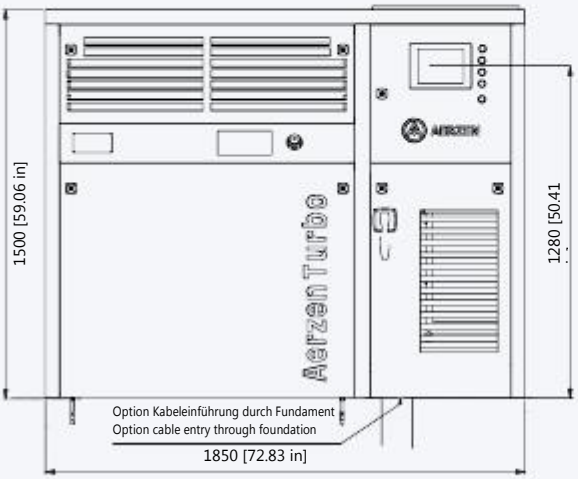
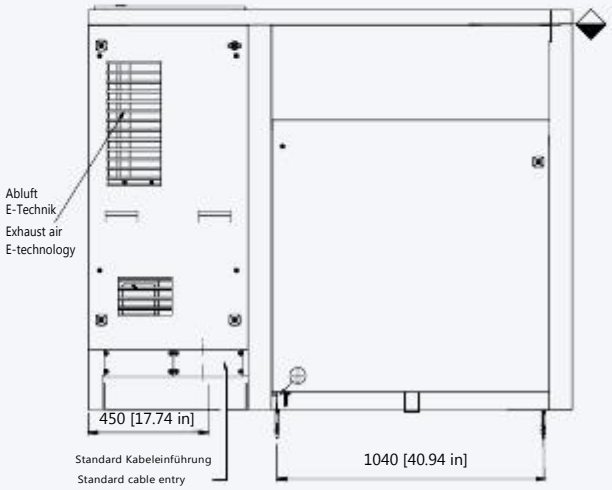
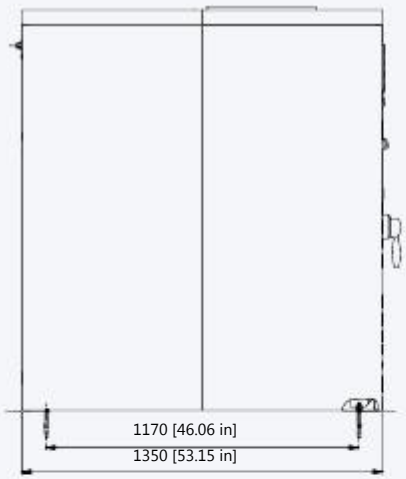
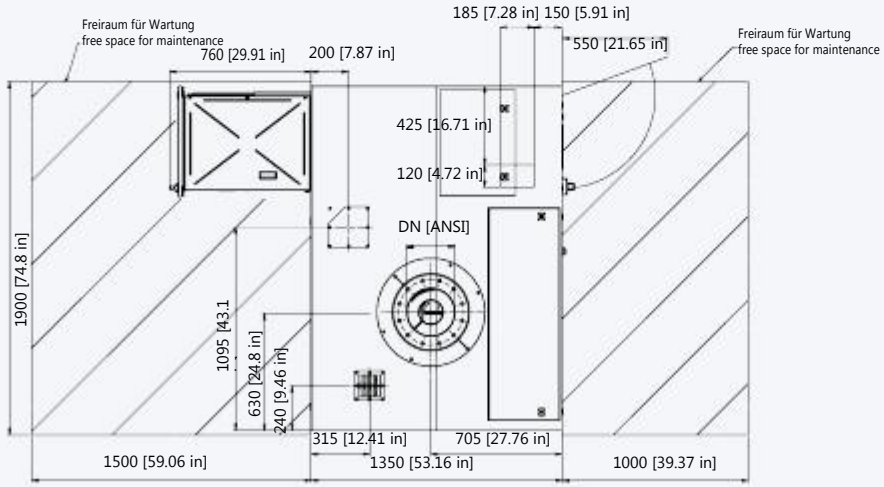
# AERZEN TURBO AT 200 - 1.0 S

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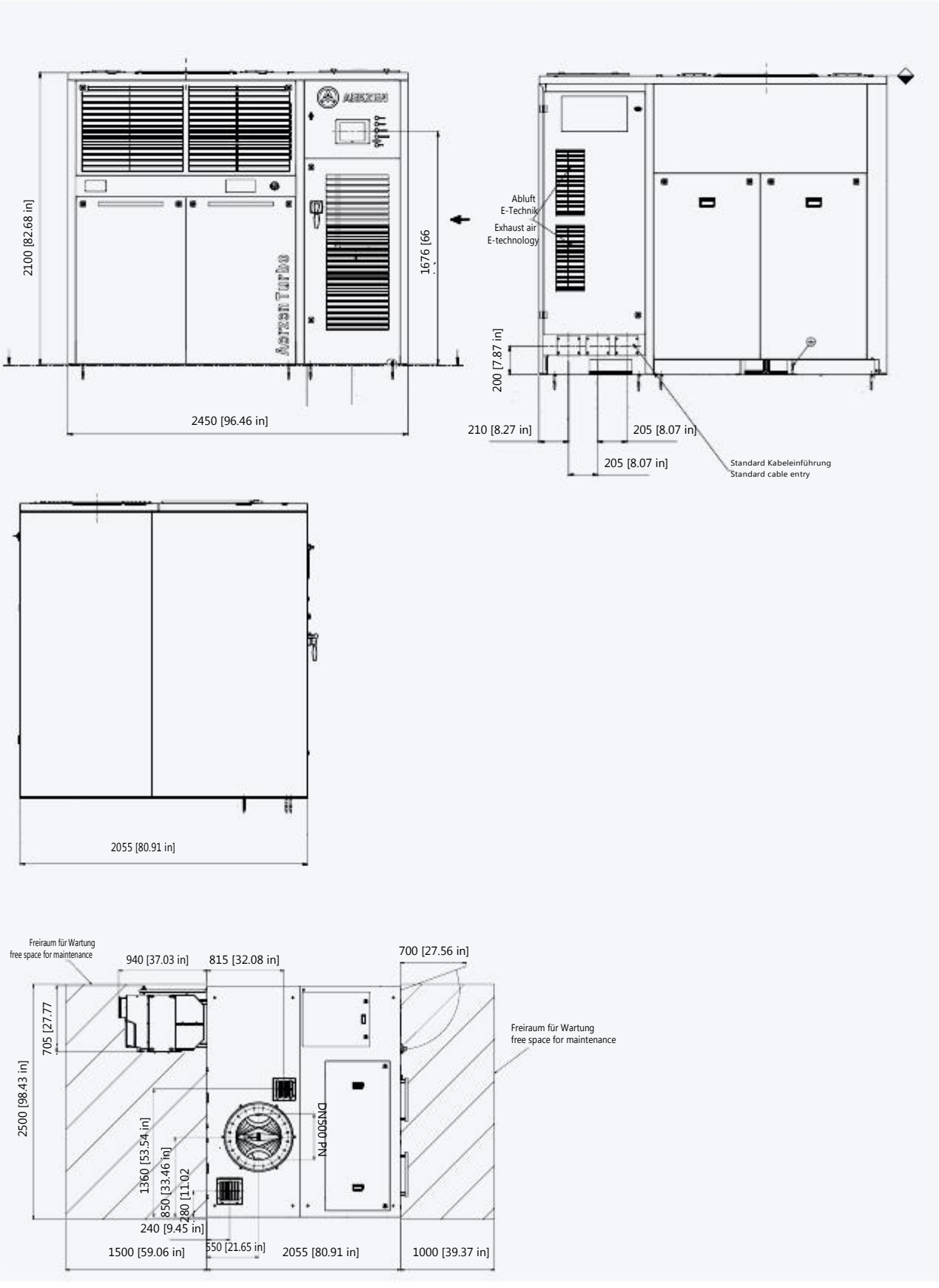


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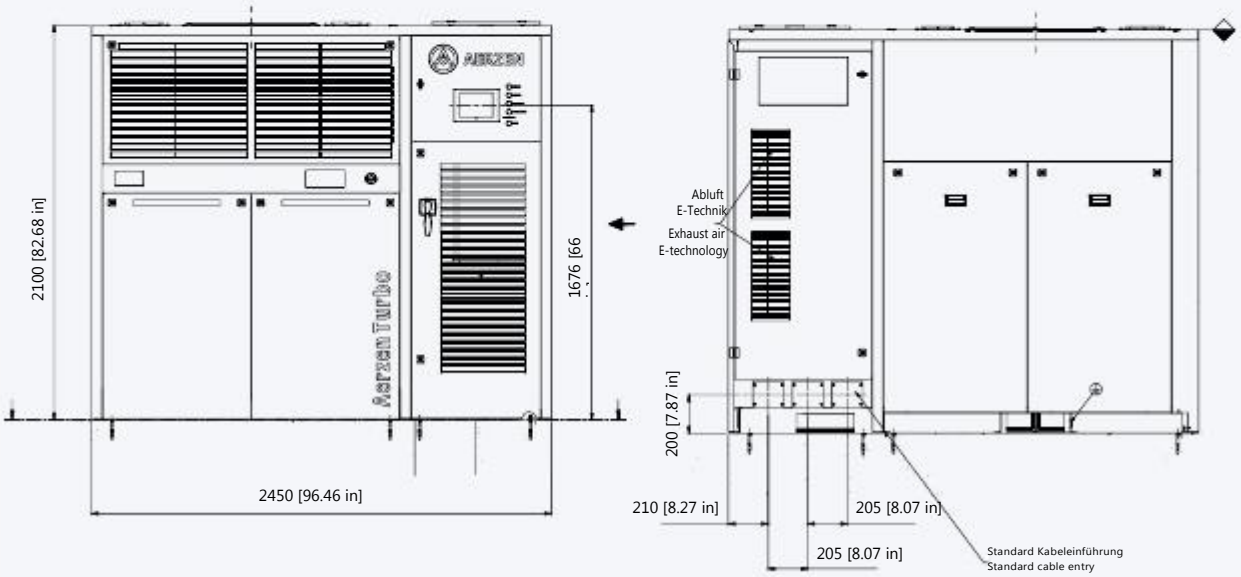


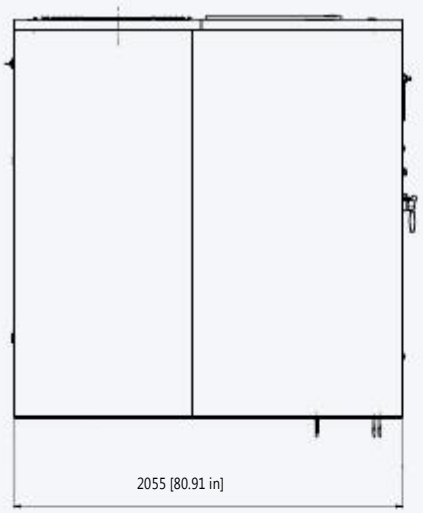


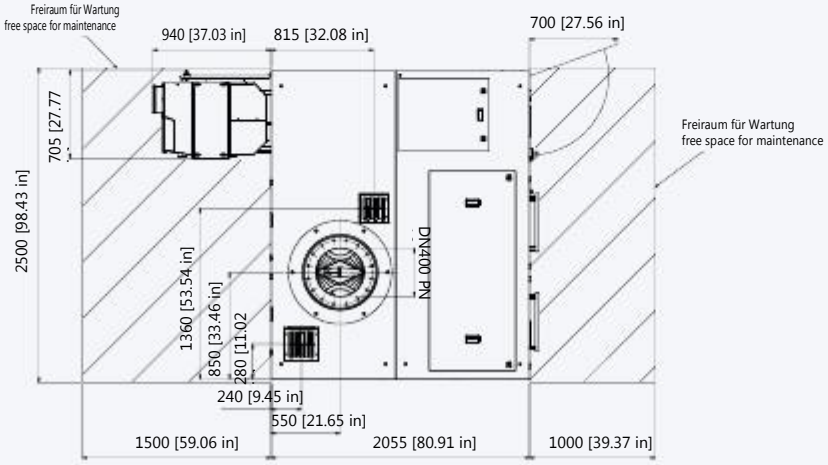


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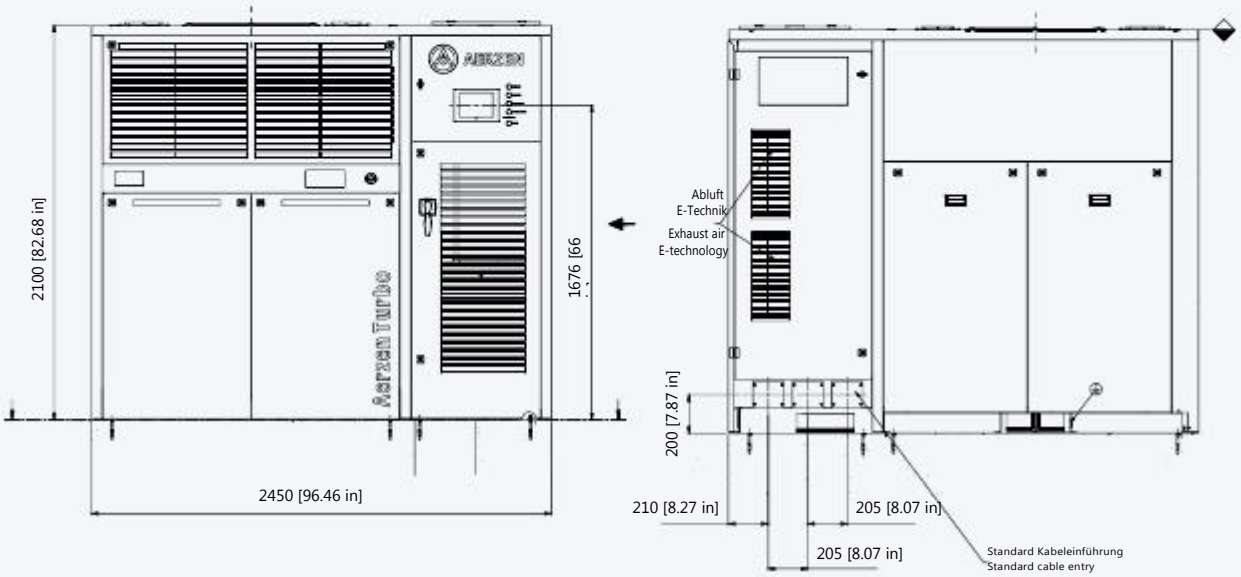
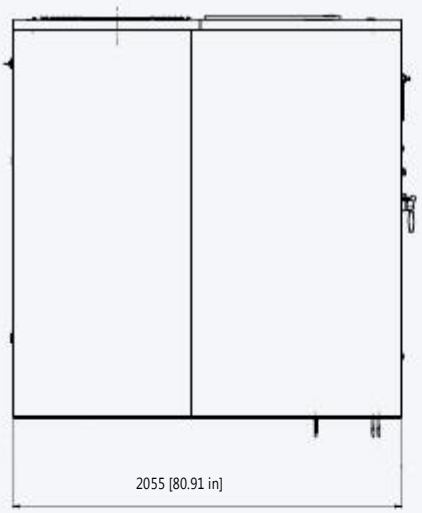
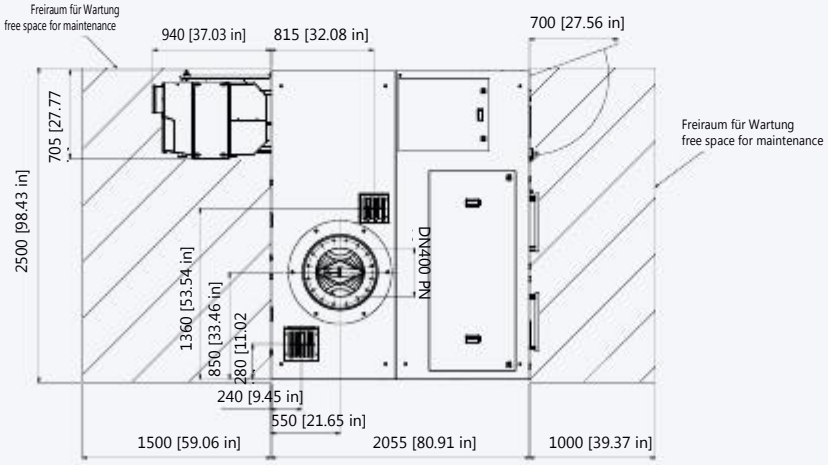
# AERZEN TURBO AT 300 - 1.0 T

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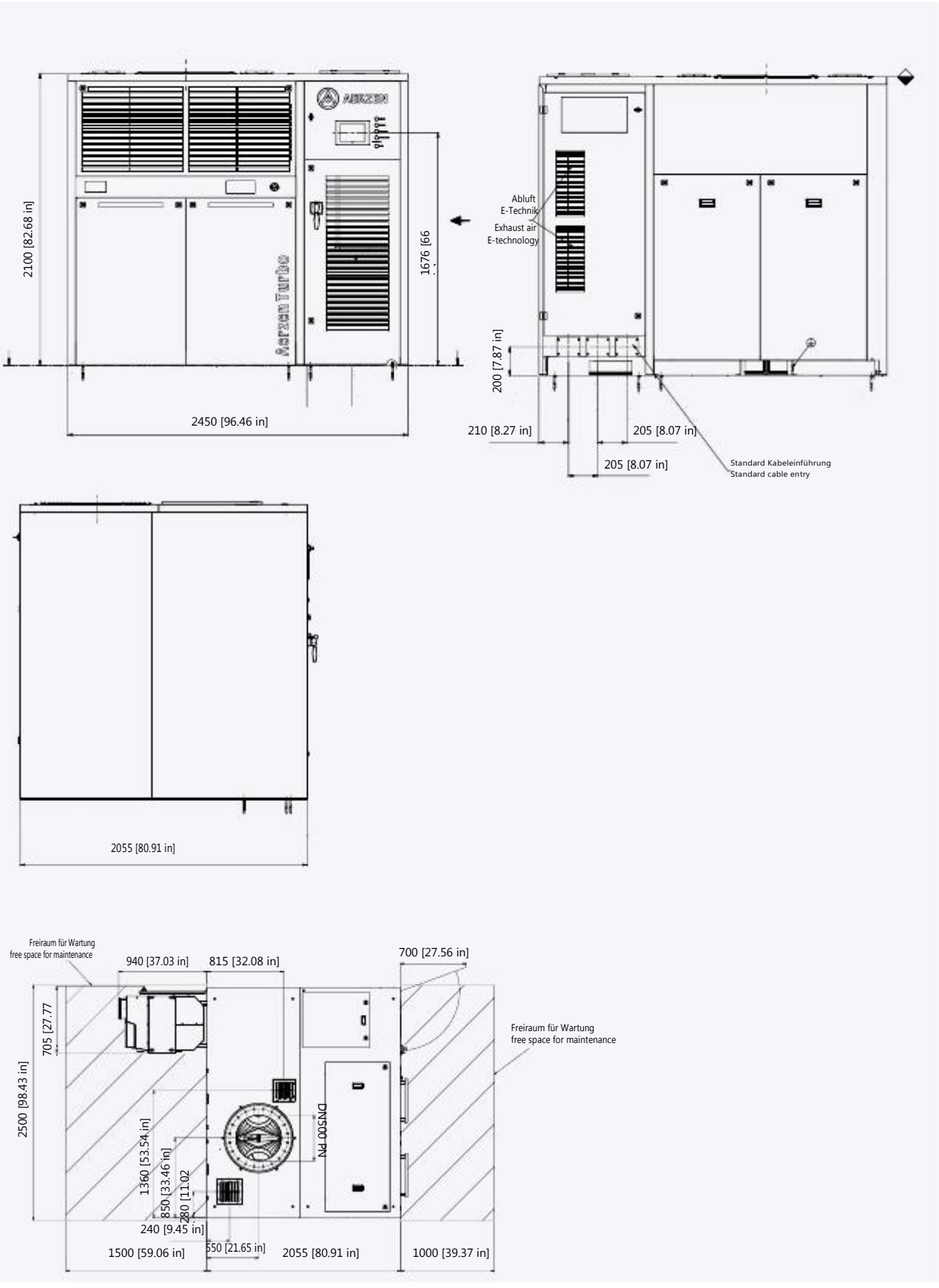
# AERZEN TURBO AT 400 - 0.8 T

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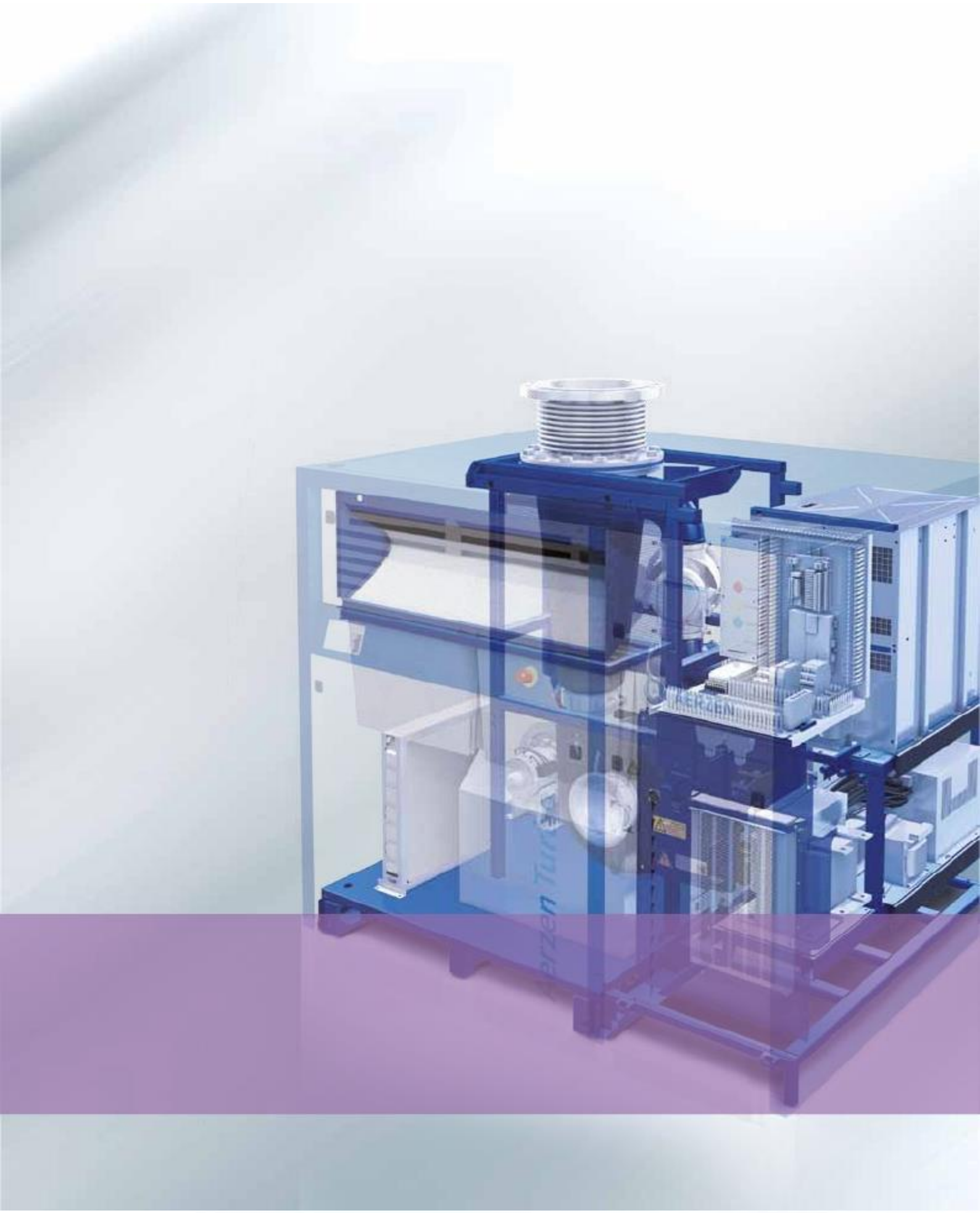
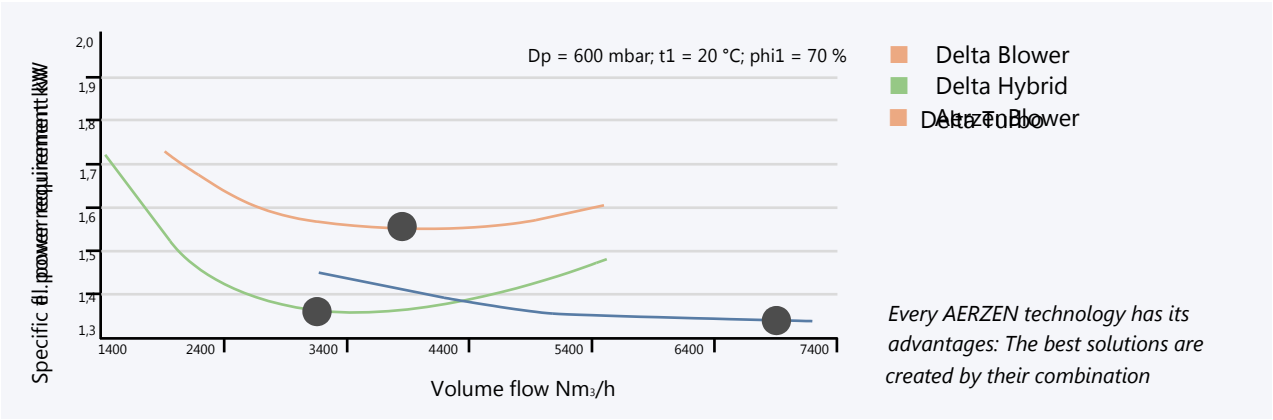


# **PERFORMANCE³.** FOR A NEW EFFICIENCY IN THE AERATION TANK.

The word upheaval means: revolution. This occurs in wastewater treatment plants all over the world The participants: innovative fan combinations of blower, hybrid and turbo technology by AERZEN. For the first time, this combination guarantees an exact supply of the treatment basin with process air. Result: a never before seen energy efficiency. The saving effects surprise, convince, enthuse. The investment can pay off after as little as 2 years!

Exact operation of load changes.
Significant fluctuations characterise the load operation in biological wastewater treatment plants. Depending on the region, time of year and day or rainfall, wastewater amounts and levels of pollution can change suddenly. To ensure that a suitable solution can be found, different technologies are used in wastewater technology.

Predominately, these are turbo blowers, positive displacement blowers and rotary lobe compressors. A combination of these high-performance technologies is ideal to achieve a maximum of energy efficiency. Assuming they coordinate perfectly – Performance³.




*Every AERZEN technology has its advantages: The best solutions are created by their combination*

Technology innovation stands for individual components which perform strongly. And for perfectly integrated complete solutions.
AERZEN's three high-performance compressors offer a unique solution portfolio for the oil-free infeed of oxygen into the aeration tanks.
And all this from one place. This refers to the turbo blower Aerzen Turbo Generation 5, the positive displacement blower Delta Blower and the rotary lobe compressor Delta Hybrid. This broad range means that the three units suit the most diverse system-specific requirements. Combined they guarantee a performance which suits the requirements of changing load profiles perfectly. From the basic load to supply peaks. This solution portfolio is called Performance³.

Every technology, be it displacement or flow machine, has its strengths and weaknesses. The turbo blower is second to none when it comes to energy efficiency. The regulation range spans approx. 40-100%. However, during partial load operations, the flow machines are less efficient. This is a strength of displacement machines such as the Delta Blower and Delta Hybrid. They profit from their large regulation range of 25-100% and demonstrate good levels of efficiency even for partial loads. The advantages of the three high-performance technologies add up to a never before seen energy efficiency for total operations in combined systems: Highest energy savings, best regulation range and lowest investment costs. Depending on the system, the saving means that the modification of the system has paid off after just 2 years.

# ACCESSORIES FOR WASTEWATER TECHNOLOGY.

## EXTERNAL POWER CABINET

For Delta Blower and Delta Hybrid

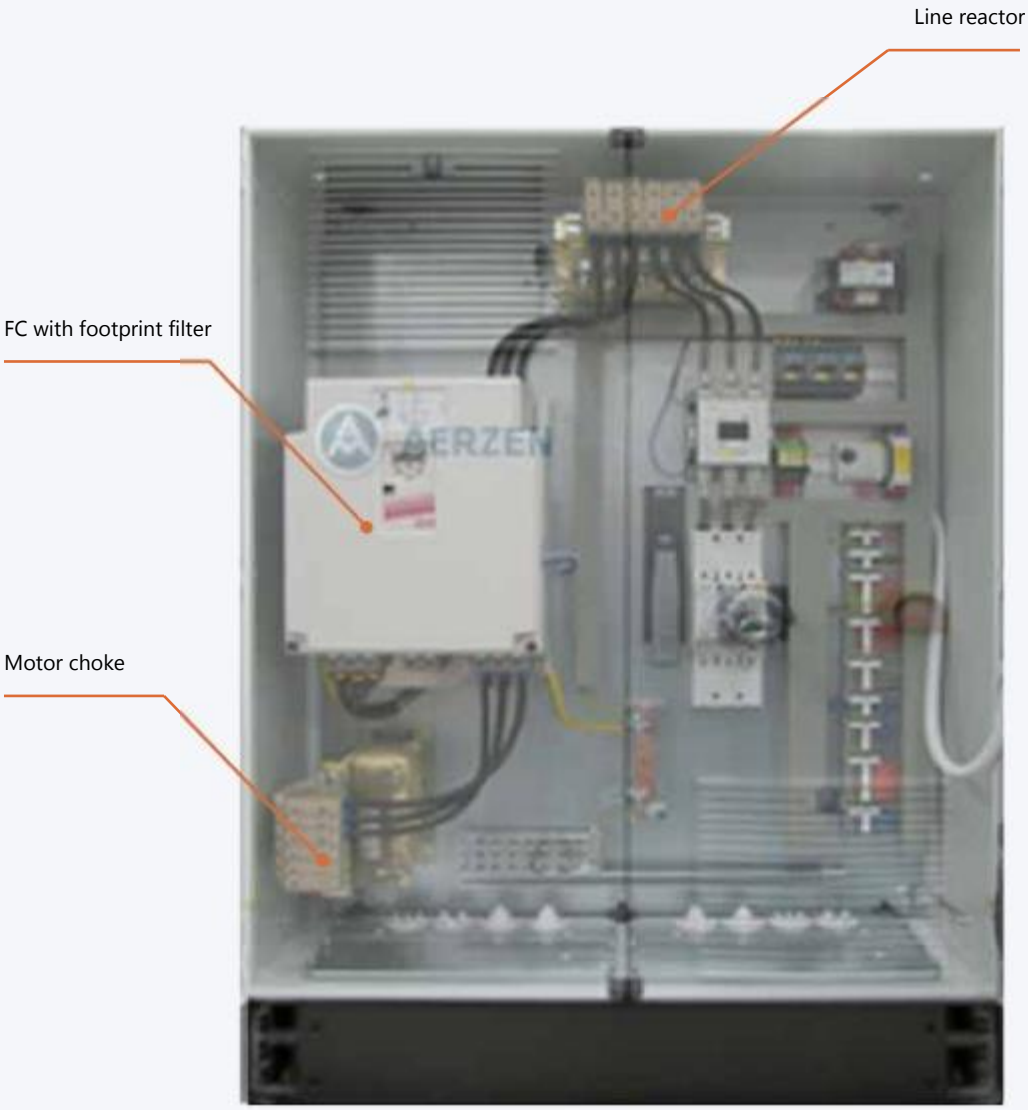
External power cabinet with integrated frequency converter (without AERZEN control)
· Best solution for stepless start-up and speed change (due to adjustable current limiting, high currents in the electrical network are prevented)
· Enables smooth speed (frequency) control
· Less strain on the network during start-up
· Thanks to process optimisation (Adjustment of motor speed) => Energy efficient)
· High relative starting torque for low current

Requirements:
· Motor speed specification at site
· Wiring work from power cabinet to motor supplied by the customer
· Wiring works PTC resistor monitoring to power cabinet at site
· Delivery, laying and connection of cables to be carried out at site

Characteristics
· operating voltage: 400 V/50 Hz or 460 V/60 Hz
· Performance range: 3 kW – 710 kW
· For systems with a constant torque progression (positive displacement blower, rotary lobe compressor and screw compressor)
· Housing protection (hazardous area) IP54
· TN network configuration
· Indoor installation (tempered, non-ex free space)
· Ambient temperature max. 35°C (Average value/24h)
· 1000 m above sea level
· Signal for motor excess temperature

Options:
· Conventional control
· Acoustic hood installation (integrated solution) up to 160kW
· outdoor installation
· System in Ex area
· (Connection instrumentation in ex-design / power cabinet ex-free)
· Different voltages (380V-690V)
· Network forms TN/TT/IT network
· Cabinet heater to avoid condensation
· Ambient temperatures up to 50°C
· Frequency converter interface optionally as Profibus-Profinet - Modbus etc.

Scope of supply
· Main switch/Design Power switch
· Control transformer incl. primary and secondary saving
· Emergency-stop relay + Emergency-stop button
· Mains contactor
· Frequency converter incl. line reactor, HF filter and motor choke
· Frequency converter operating panel
· Delivery terminal block for connection to an overriding system


Line reactor
FC with footprint filter
Motor choke

# FREQUENCY CONVERTER WITH ACCESSORIES

Characteristics
· Low switching loss due to IGBT power supply panel
· Low noise development due to high switching frequencies
· Comprehensive hardware protection for current, voltage and temperature
· Voltage and current monitoring in static and dynamic operation
· Limited resistance to short-circuiting and earth faults
· Hardware current control
· Integrated fan
· Analog input: 0 to 10V / (0)4 to 20mA
· Analog output: 0 to 10 V
· Programmable digital inputs
· Programmable outputs: e.g. relay
· Programmable parameter sets

Scope of supply:
· Pre-parameterised frequency converter
· Delivery with additional components «Digital operator» (without RS232/485 interface)
· Including HF filter
· Including power / motor choke (depending on performance)
· From 450 kW, available with additional synchronisation choke

Dimensions and weights

| Performance [kW] | Weight [kg] | Dimensions [WxHxD; mm] | Design as: |
|---|---|---|---|
| 3 | 75 | 760x760x300 | Wall cabinet |
| 4 | 75 | 760x760x300 | Wall cabinet |
| 5,5 | 75 | 760x760x300 | Wall cabinet |
| 7,5 | 80 | 760x760x300 | Wall cabinet |
| 11 | 80 | 760x760x300 | Wall cabinet |
| 15 | 80 | 760x760x300 | Wall cabinet |
| 18,5 | 150 | 800x1000x400 | Wall cabinet |
| 22 | 160 | 800x1000x400 | Wall cabinet |
| 30 | 170 | 800x1000x400 | Wall cabinet |
| 37 | 170 | 800x1000x400 | Wall cabinet |
| 45 | 280 | 1000x1400x400 | Standing cabinet |
| 55 | 280 | 1000x1400x400 | Standing cabinet |
| 75 | 280 | 1000x1400x400 | Standing cabinet |
| 90 | 280 | 1200x1400x500 | Standing cabinet |
| 110 | 500 | 1000x1200x600 | Standing cabinet |
| 132 | 500 | 1000x1200x600 | Standing cabinet |
| 160 | 500 | 1000x1200x600 | Standing cabinet |
| 200 | 750 | 1600x2000x600 | Standing cabinet |
| 250 | 750 | 1600x2000x600 | Standing cabinet |
| 315 | 900 | 2200x2000x600 | Standing cabinet |
| 355 | 1000 | 2200x2000x600 | Standing cabinet |
| 400 | 1000 | 2200x2000x600 | Standing cabinet |
| 450 | 1300 | 2400x2000x600 | Standing cabinet |
| 500 | 1300 | 2400x2000x600 | Standing cabinet |
| 560 | 1800 | 3200x2000x600 | Standing cabinet |
| 630 | 1800 | 3200x2000x600 | Standing cabinet |
| 710 | 1800 | 3200x2000x600 | Standing cabinet |

*Dimensions and weights of the power cabinets are defined according to the nominal power as well as the cabinet design.*

# INTEGRATED POWER CABINET WITH FREQUENCY CONVERTER IN ACOUSTIC HOOD (ONLY UP TO 160 KW)

The power supply panel is integrated into the unit below the acoustic hood. It is delivered with the unit completely wired and is operational. The AERZEN control unit «AERtronic» is necessary to operate the system. Please consider the additional cost for the AERtronic extension module «Frequency converter control», see above.
> only for indoor installation - Ambient temperature - 10°C to + 35 °C

Currently, the power supply panels with FC are used for the following units.

| Unit type | Unit size |
|---|---|
| Positive displacement blower - DB | GM10S, GM15L, GM25S, GM30L, GM35S, GM50L, GM60S |
| Rotary lobe compressor - DH | D12S/E/H, D17L, D24S/E/H, D28L, D36S/E/H, D46L, D52S, D62S/E/H |

# SILENCER.

**As already described, pipe sounds can have a significant impact on the sound perception of the entire ventilation unit. The pipe sound depends significantly on the individual pipework. It is possible to install additional damping directly downstream of the noise source to reduce sounds which are too loud.**

Even the standard versions of AERZEN products are designed, to supply absorption-material free process air. That means that the silencers integrated into the discharge side of the unit are designed in metal and operate using an interference principle. This has different advantages:

· The process gas has the necessary quality and purity.

Due to the discontinuous thermal load, the pressure load and pulsations, the fibres of the absorption material, which is often made from plastics, dissolve after a certain operating time. This means they end up in the gas and, if they are sufficiently small, travel through the fan into the water which is due to be cleaned.

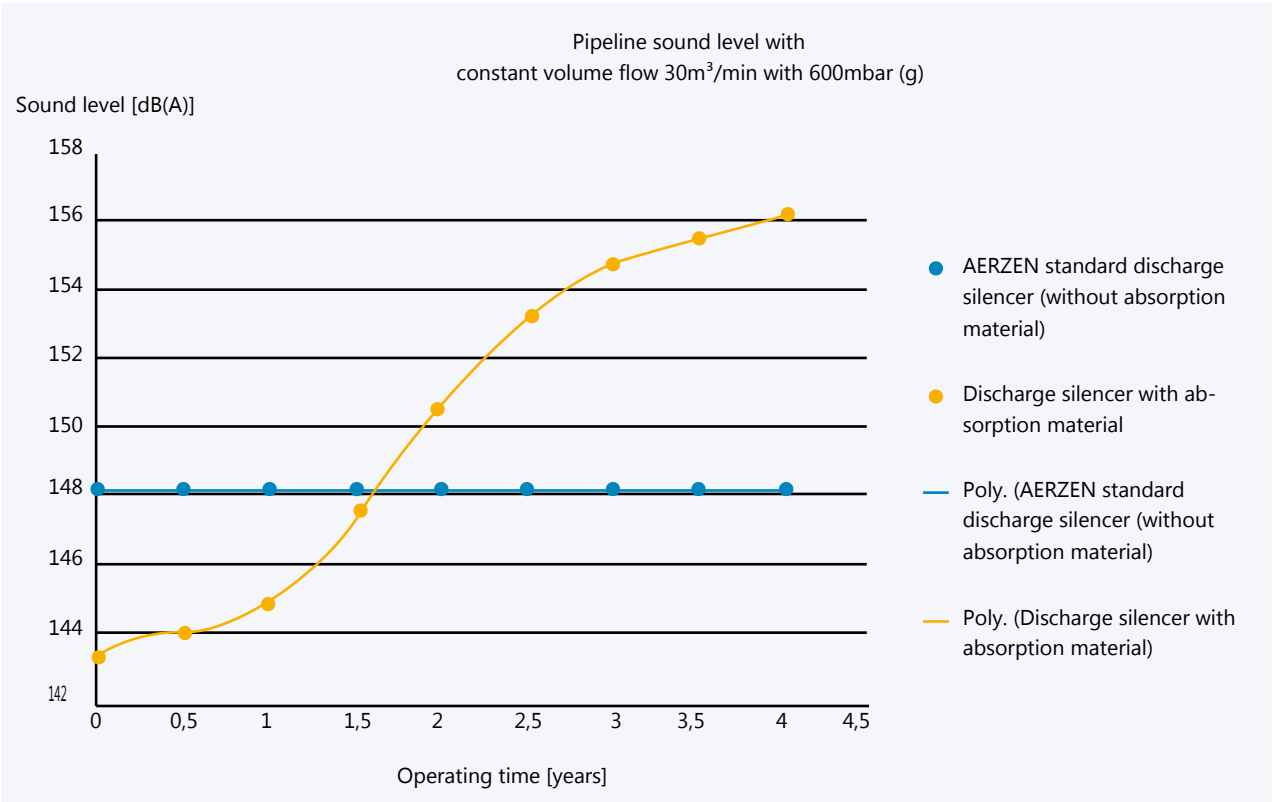
· The energy efficiency remains constant

The porous absorption material dissolves into small and larger pieces. The smaller pieces reach the water via the fans. The larger pieces get caught in the fan elements and block the openings for the fine-bubble ventilation. As these blockages worsen, the counter pressure increases and, thus, the necessary power consumption for the ventilation.

· The noise development on the discharge side compared to the total operation period of the packaged unit remains constant

It is the job of the absorption material to absorb sound. That means that the silencer loses its soundproofing properties as the absorption material diminishes.

Example for the sound development compared to usage time

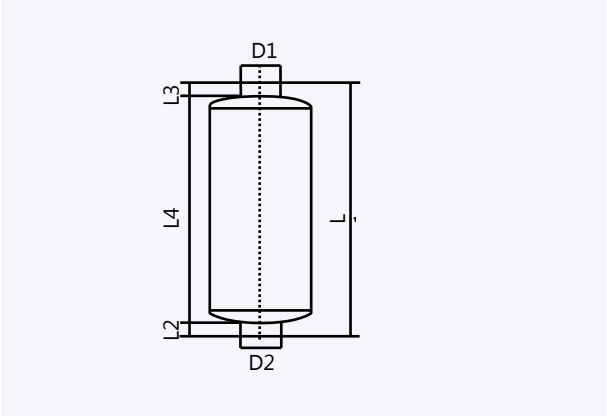


AERZEN offers additional pipeline silencers in the following nominal connection sizes:
· DN 100
· DN 125
· DN 150
· DN 200
· DN 250
At AERZEN, these nominal sizes are available in the following kinds of silencers:

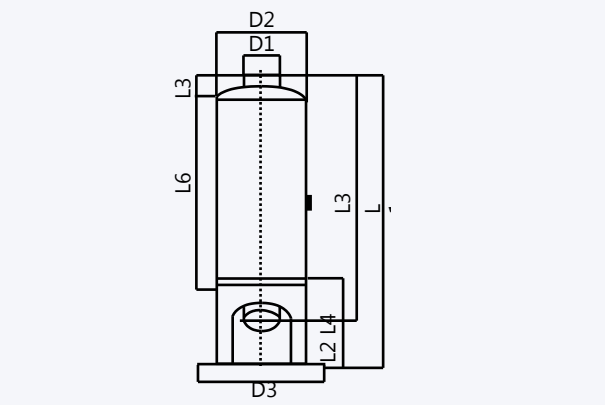
Slotted tube reactive silencer
Silencer constructed as slotted tube reactive silencer, with metallic inserts and therefore without any absorption material. The effect is created using the interference principle which achieves a damping of -20 to -25 dB(A).

Cartridge silencer
Pipeline silencer constructed as cartridge silencer. This type of silencer achieves its effect by using conventional absorption materials. These silencers are installed in the pipeline, which means that the thermal effect and the impact of the conveying impulse (blower/compressor stage) only have a minimal effect on the erosion of the absorption material. A damping effect of -8 to -10 dB(A) can be achieved.

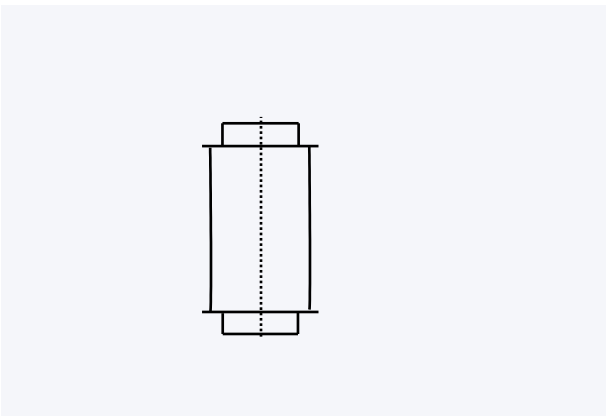
Silencer Schliro horizontal with sleeve connection



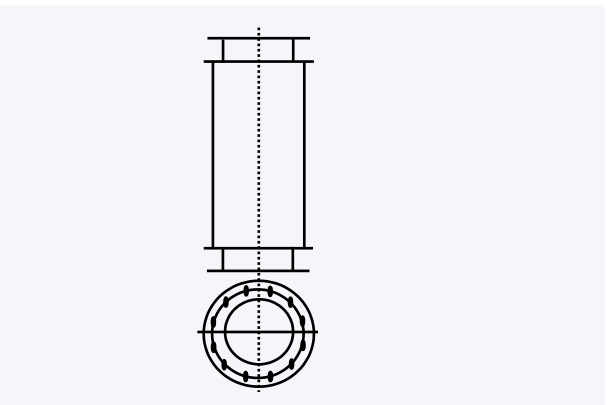

Silencer Schliro vertical with sleeve connection




Silencer with insulating cartridge sleeve connection



Silencer with insulating cartridge flange connection



# **PERFECTION MATURED OVER 150 YEARS:** AERZEN'S SERVICE WoRLD.

**The long service life of AERZEN machines is legendary. Why then is service a topic at all? Because this is about more than availability and OEM original parts. AERZEN services protect your investment, productivity, the deciding advantage over the competition. All over the globe.**

The AERZEN on-site service.
Our service teams work wherever the machines are. Worldwide. Onshore or Offshore. Often in extreme conditions. How do we achieve this? With short distances. AERZEN has built a network of service support locations and decentralised part warehouses all over the globe for you. More than 200 excellently trained service technicians are available to you. Anytime and wherever you need them.

About Rental Service and other services.
AERZEN's service world offers a lot. For example, tailor-made service kits. Exchange stage, machine diagnostics, sound-technical optimisations. One of our most important services is the AERZEN Rental Division and offers a large fleet of rental machines. Blowers, turbos and compressors by AERZEN. In different performance classes. For all standard pressure ranges. Usable immediately and delivered ready-to-use on request. What does this mean for you? You are always equipped, even for unexpected needs.


Commissioning
It goes without saying that the commissioning of AERZEN machines onsite is part of our service. We will do the following:

· Installation checks and alignment using lasers
· Creation of operational readiness of stage oil filling, cooling agent, etc.
· The inspection of all safety-relevant units, such as alarm and deactivation values or messages to superordinate controls/control room
· Commissioning of the unit
· A test run in operating conditions over several hours
· Preparation of a handover log

With the best recommendations of your OEM.
We have been manufacturing quality products for more than 150 years. At the same time, a suitable service world has been developed. With tailor-made offers for each life stage of your machine. With OEM original parts and reliable logistics and a performance-strong service in the focus. And decentralised service locations near you which guarantee fast supply of spare parts and competent service - worldwide.

# **TENDER SPECIFICATIONS FOR SERVICE AND MAINTENANCE CONTRACTS.** APPLICATIoN FoR STANDARD AIR MACHINES IN GERMANY.

Whether you would like a basic maintenance contract or an optimum contract for your machine or machine configuration by AERZEN also depends on the availability of your own technical personnel. Use your own resources accurately and only "purchase" those external capacities which you really need. Our service packages leave a lot of room for design possibilities for individual agreements.

## BASIC MAINTENANCE CONTRACTS

Service contract: Partial maintenance 1
The work scope includes the inspection and maintenance of units and unit parts per year. Inspection and maintenance works are carried out according to the maintenance plan of the manufacturer 's operating manual.
The inspection of units contains determination of smoothness, stage clearances, the oil level and oil density, and also the conveying chamber. The pressure valve (safety valve), the start unloading device (if it exists) and the check valve are inspected.
The maintenance work includes the oil replacement, the replacement of suction filters and the components for power transfer (V-belt, compression sleeves). The construction parts of the transmission are aligned. The carried out work is documented in a checklist with notes for further work, if necessary.

Contract properties

- Contract period 3 years
- one service call per year
- Use of Aerzen oEM parts
- Wear parts are invoiced in addition to the annual fee
- 6 months warranty on all work carried out and installed parts
- Maintenance fee incl. travel expenses as well as accommodation and food costs

Service contract: Partial maintenance 2
The work scope includes the inspection and maintenance of units and unit parts per year. Inspection and maintenance work is carried out according to the maintenance plan of the manufacturer 's operating manual.
The inspection of units contains an assessment of smoothness, stage clearances, the oil level and oil density, and also the conveying chamber. The pressure valve (safety valve), the start unloading device (if it exists) and the check valve.
The maintenance work includes the oil replacement, the replacement of suction filters and the components for power transfer (V-belt, compression sleeves). The construction parts of the transmission are aligned. The carried out work is documented in a checklist with notes for further work, if necessary.

Contract properties
- Contract period 3 years
- one service call per year
- Use of Aerzen oEM parts
- Wear parts included in the annual fee
- 6 months warranty on all work carried out and installed parts
- Maintenance fee incl. travel expenses as well as accommodation and food costs

# OPTIMUM MAINTENANCE CONTRACTS

Service contract: Servicing
The work scope includes one inspection and maintenance of units each and unit parts as well as any necessary service calls per year. Inspection and maintenance works are carried out according to the maintenance plan of the manufacturer 's operating manual. The inspection of units contains determination of smoothness, stage clearances, the oil level and oil density, and also the conveying chamber. The pressure valve (safety valve), the start unloading device (if it exists) and the check valve are inspected. The maintenance work includes the oil replacement, the replacement of intake filters and the components for power transfer (V-belt, compression sleeves). The construction parts of the transmission are aligned. The carried out work is documented in a checklist with notes for further work, if necessary. This work is carried out at the next service call.

Contract properties

· Contract period 5 years
· one service call per year
· Use of Aerzen oEM parts
· Wear and spare parts are included in the fee
· Warranty throughout the contract period
· A general inspection during the contract period
· Maintenance fee incl. travel expenses as well as accommodation and food costs.

Service contract: Complete maintenance
The work scope includes the inspection and maintenance of units and unit parts as well as any necessary service calls per year. Inspection and maintenance works are carried out according to the maintenance plan of the manufacturer 's operating manual. The inspection of units contains determination of smoothness, stage clearances, the oil level and oil density, and also the conveying chamber. The pressure valve (safety valve), the start unloading device (if it exists) and the check valve are inspected.
The maintenance work includes the oil replacement, the replacement of intake filters and the components for power transfer (V-belt, compression sleeves). The construction parts of the transmission are aligned. Worn spare parts are replaced. The carried out work is documented in a checklist with notes for further work, if necessary.

Contract properties

· Contract period 5 years
· Two service calls, inspections and maintenance per year
· More detailed service calls
· Use of Aerzen oEM parts.
· Wear and spare parts are included in the fee.
· Warranty throughout the contract period
· Maintenance fee incl. travel expenses as well as accommodation and food costs.
· 24/7 Service

Service contract: Delta Care (Warranty extension)
The service contract contains the inspection and maintenance of units per year. Inspection and maintenance works are carried out according to the maintenance plan of the manufacturer 's operating manual.
The inspection of the unit(s) contains the assessment of the smoothness, clearance of the stage, inspection of oil levels and the oil density. The inspection of installed unit components.
The maintenance works include the oil replacement, the replacement of intake filters and the components for power transfer (V-belt, compression sleeves). The construction parts of the transmission are aligned. The carried out work is documented in a checklist with notes for further work, if necessary.

Contract properties

· Can be used in standard new machines, installation in Germany
· Conveyed medium Air
· Contract conclusion before commissioning
· Period variable up to 5 years
· Use of Aerzen oEM parts
· Wear parts and equipment are invoiced separately
· Spare parts included in the annual fee
· Warranty throughout the contract period
· Maintenance fee incl. travel expenses as well as accommodation and food costs.

# WEAR PARTS AND MAINTENANCE CONTRACTS.

| Wear parts | | |
|---|---|---|
| Delta Blower | Aerzen Turbo | Delta Hybrid |
| Air filter | Air filter | Air filter |
| V-belt | | V-belt |
| Oil | | Oil / Delta Lube |
| Compression sleeves/ direct drive | | Oil filter |
| Service set for re-lubrication device | | Service set for re-lubrication device |

| Maintenance contract contents (standard) Blower and Hybrid | | | | | |
|---|---|---|---|---|---|
| Contract type | Partial maintenance 1 | Partial maintenance 2 | Servicing | Complete maintenance | Warranty extension |
| Short designation | PM 1 | PM 2 | S | CM | WE |
| Period | 3 years | 3 years | 5 years | 5 years | up to max. 5 years |
| Period alternative | 1 year / automatic renewal if not cancelled | 1 year / automatic renewal if not cancelled | no | no | no |
| Contract extension possible | yes | yes | yes | yes | yes |
| Contractual form | Service contract | Service contract | Special-order contract | Special-order contract | Special-order contract |
| Service calls per year | 1 | 1 | 2 | 2 | 1 |
| Inspection | yes | yes | yes | yes | yes |
| Maintenance | yes | yes | yes | yes | yes |
| Wear parts included | no | yes | yes | yes | no |
| Oil included | no/ available upon client request | no/ available upon client request | no/ available upon client request | no/ available upon client request | no/ available upon client request |
| Spare parts included | no | no | yes | yes | yes |
| Stage revision | no | no | 1 x in 5 years | 1 x in 5 years | no |
| Repairs | no | no | yes | yes | yes |
| Creation check list | yes | yes | yes | yes | yes |
| Recommendation of further works | yes | yes | yes, implementa-tion by AERZEN | yes, implementa-tion by AERZEN | yes |
| Dynamics | 3% | 3% | 3% | 3% | no |
| Warranty | Work & parts | Work & parts | Operability | Operability | Operability |
| 24 h Service | no | no | no | yes | no |
| Infoline Mo to Fr 8 a.m. to 12 p.m. | yes | yes | yes | yes | yes |

| Inspection plan (Standard) Turbo | |
|---|---|
| Mechanical part | Electric part |
| · General visual inspection<br>· VFD cooling body cleaning (blow-off with compressed air)<br>· Impeller inspection<br>· Functional test blow-off valve<br>· Inspection of machines and piping connections (leakages and screw connections)<br>· Alignment of blower stage<br>· Inspection of VFD cooling fans<br>· Inspection of cooling air turbo | · Software and parameter inspection<br>· Inspection of software status<br>· Inspection of sensors<br>· Inspection of VFD intermediate circuit<br>· Text report logs and documentation<br>· Error log evaluation and parameter optimisation |

| Additional works for extended inspection | |
|---|---|
| Mechanical part | Electric part |
| · Disassembly of spiral casing<br>· Impeller cleaning<br>· Disassembly spiral casing cooling turbo<br>· Impeller cleaning on cooling turbo | · Disassembly of electrolyte condensors (6 - 18 pieces)<br>· Inspection of electrolyte condensors (measurement of capacity)<br>· Inspection of semiconductors, e.g. IGBTs, SCRs<br>· Replacement of VFD cooling fans<br>· Calibration of sensors<br>· General visual inspection |

Expected time effort for additional works: 1 to 2 days

| Maintenance and inspection package Turbo | | |
|---|---|---|
| Maintenance contract Turbo: Basic 1 | Maintenance contract Turbo: Basic 2 (at least 4 years) | Maintenance contract Turbo: Professional (at least 4 years) |
| · Travel costs<br>· Annual inspection (Standard)<br>· Maintenance<br><br>Wear parts: not included (depending on effort)<br><br>Spare parts: not included (as per expenditure) | · Travel costs<br>· Annual inspection (Standard)<br>· After 4 years inspection (extended)<br>· Maintenance<br><br>Wear parts: included<br><br>Spare parts: not included (as per expenditure) | · Travel costs<br>· Annual inspection (Standard)<br>· After 4 years inspection (extended)<br>· Maintenance<br>· Warranty extension<br><br>Wear parts: not included (as per expenditure)<br><br>Spare parts: included |

# **AERZEN RENTAL DIVISION.**
# AERZEN'S RENTAL SERVICE.

**Maintenance or repair, but also unexpectedly originating requirement: There may be many reasons to call AERZEN Rental Division, AERZEN's international rental service. AERZEN Rental Division supports you with rental units and accessories, offers individual solutions for research and development, operative leasing and contracting.**

Your company remains flexible. Your air oil-free.
Good to know that you're prepared! AERZEN's Rental Division offers quick solutions for 100 % oil-free air. For almost every industry segment. Ad hoc or on a contractual basis (Service level agreement). Our fleet of rental machines includes a large number of usable blowers and compressors of different performance levels and for all standard pressure ranges. Our Engineering department has expert knowledge of your applications, that is why our solutions fit your processes so seamlessly.

Ready-to-use services.
AERZEN Rental Division is also available to you for the project realisation and offers not only the rental units but also transport, installation and commissioning with our own expert personnel. Of course, the service package includes regular maintenance and servicing of the machines - to ensure you achieve your production aims without "running out of air "!

Around the clock, seven days a week.
The speedy service of the Aerzen Rental Division distinguishes itself from other providers. This starts with our hotline. You can reach us seven days a week around the clock. We compile an emergency plan for you. We then deliver and install the rental unit with pipelines and other desired systems. It is connected to your production process and is started up by the push of a button! Aerzen Rental Division has facilities all over Europe. That means that our rental units and our Know-how are always close by.


Services:
· Directly available rental units
· Quick delivery across Europe
· Customisation according to your specific requests
· Extensive accessories:
  · Power cable/power supply
  · Pipework
  · Cooler & dryer
  · Ventilation plates for wastewater treatment plants
· Projects for research and development
· Customisation according to your specific requests
· Rapid service with 24/7/365 hotline
· Quick delivery from warehouses all over Europe
· Rental of extensive accessories, e.g.
  · Cooler
  · Air dryer
  · Transformers
  · Diesel generators

We support you with:
· Production downtime
· Bridging of maintenance and repair
· Process optimisation
· Production peaks
· New construction and conversion of units
· Research and development
· Water and wastewater treatment
· Ventilation
· Backwash of filters
· Pneumatic conveying of bulk materials
· Gas conveying
· Degassing
· Dedusting
· Generation of negative pressure
· Biogas treatment and much more

# AERZEN WORLDWIDE.
## ALWAyS CLoSE.

**It is all good and well to buy and install an AERZEN machine. But we offer more. We look after your machine investment during its entire life cycle - for more performance and an optimal cost-benefit relation. This requires presence. To ensure competent advice and quick service, we have built up a network of subsidiaries and service representations all over the world. Good feeling!**

Contact worldwide
2,000 people are employed by AERZEN. On all continents. We have six offices in Germany alone. And we have 45 subsidiaries in more than 100 countries of the world. This means we do not have to travel far - if you need us. Call us:
+49 5154 81-0/ www.aerzen.com

Service-Hotline
We are there for you, even if we are not there - outside our office hours. Call AERZEN directly via our regional service hotlines:
+49 171 3511834

Customer Net
Where can you find out more about our company and leading compressor technologies from Aerzen? Simple: Using the Customer Net on our homepage. We have collected everything you might want to know.
www.aerzen.com

# CONTACT SHEET
## PLEASE SEND THIS To:
## +504 99603830

Application _____
Wastewater treatment plant
Postcode, City _____

Number of machines _____

Conveying medium _____

intake volume flow _____ $m^3/min$ - $m^3/h$

Intake temperature _____ C°

Intake pressure _____ bar abs

Pressure difference _____ mbar

| | | | | | |
|---|---|---|---|---|---|
| Drive type | ☐ | Constant speed | ☐ | Frequency converter | |
| Motor drive | ☐ | Direct | ☐ | Star-delta | ☐ At FC |
| Suction | ☐ | Via filter | ☐ | Via pipeline | |
| Acoustic hood | ☐ | With | ☐ | Without | |
| Installation | ☐ | Indoor | ☐ | Outdoor | |

Instrumentation Analogue - Standard (Pressure gauge + Maintenance indicator)

☐ Optional intake pressure/discharge pressure switch and contact thermometer

| | | | | |
|---|---|---|---|---|
| Instrumentation Dialogue | ☐ | AERtronic | ☐ | Ext. Interface Profibus DP |

Company _____ Email _____

First, last name _____ Phone _____

Street/No. _____ Mobile _____

City _____ Fax _____

Comment: _____

_____

_____

AERZEN
EXPECT PERFORMANCE