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ROTARY LOBE COMPRESSORS

New Aerzen Rotary Lobe Compressor-Packages: Delta Hybrid
Volume flows from 110 m³/h to 4.100 m³/h (65 to 2400 cfm)

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AERZENER MASCHINENFABRIK
GMBH

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Innovation from tomorrow's world

Delta Hybrid

Aerzener Maschinenfabrik, founded in 1864, employs today some 1700 associates worldwide and is present in over 100 countries with over 30 subsidiary companies and many representatives. Relying on experience in the design and production of rotary lobe blowers since 1868 and screw compressors since 1943, Aerzen has continually set new standards for quality and innovation in the field of twin-shaft positive displacement machines. Aerzener Maschinenfabrik counts among the pioneers of compressor technology and is today one of the leading manufacturers worldwide.
This unique combined experience from the worlds of rotary lobe blowers and screw compressors is the foundation upon which the new groundbreaking and future-oriented Delta Hybrid technology has been developed – the first series of Rotary Lobe Compressors!

The Best of two Worlds

Delta Hybrid

The groundbreaking Rotary Lobe Compressor is the result of a synergy between the rotary lobe blower and the screw compressor technologies and offers completely new possibilities by combining the technical advantages of both concepts.

A total of 7 patents or patent applications currently make the Delta Hybrid one of the most innovative products in compression technology.

While low pressure applications call for the Roots-Principle of isochoric compression, the screw compressor, with its internal compression, becomes the preferred choice for its energy efficiency in higher pressure ranges.

The package concept is based on the well known and successful Aerzen Delta design (Delta Blower and Delta Screw) and has been systematically upgraded.

www.delta-hybrid.com

The Delta Hybrid technological advantages:

- **Highest energy efficiency and reduction of the Life Cycle Costs**
- **Reliability and durability**
- **Low noise levels, without absorption material**
- **Space saving, ease of handling and reduction of maintenance costs**
- **Expanded operating- and increased pressure range**

Delta Hybrid

Reliability and Durability

Following extensive field tests under harshest operating conditions and after over three years of operation in various applications, the Delta Hybrid-packages are ready for their market introduction.

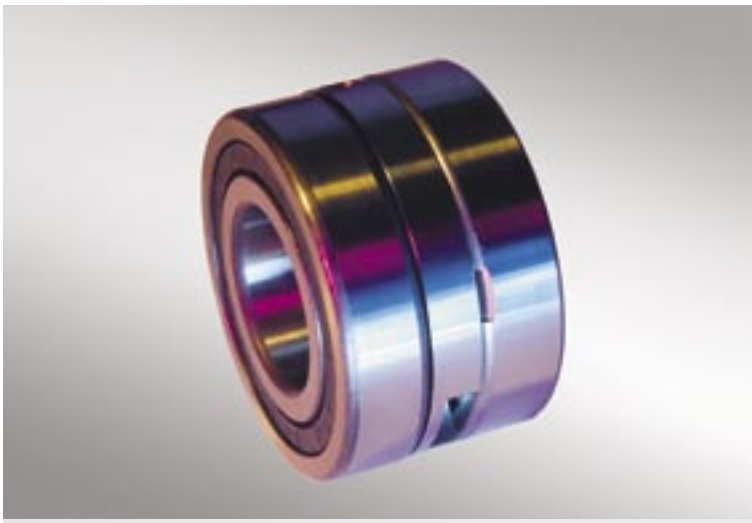
In wide-ranging research, Aerzener Maschinenfabrik developed new seal solutions at the drive shaft and at the rotor chamber to minimize the natural wear. A new Aerzen patented bearing system extends the bearing life to over 60 000 operating hours (at a differential pressure of 1000 mbar (15 psi).

As in previous generations, the Delta Hybrid features a purely reactive discharge silencer.

Since absorption material breaks down over time, Aerzen has avoided its use to prevent contaminating the downstream process system.

This makes it suitable for use in pneumatic conveying systems in the food industry.

This avoids any accumulation of broken-down absorption material in the fine diffuser systems of wastewater treatment plants, therefore preventing clogging, high cleaning costs and possibly reducing plant operating capacity.



The patented bearing of the Delta Hybrid-Aggregate has a life exceeding 60 000 hours (p = 1000 mbar – 14.5 psi)

Wastewater treatment plant Bad Reichenhall: 58 000 inhabitants, in operation since 2009

Rohrdorf Zement: yearly production of 1.000.000 t, in operation since 2008

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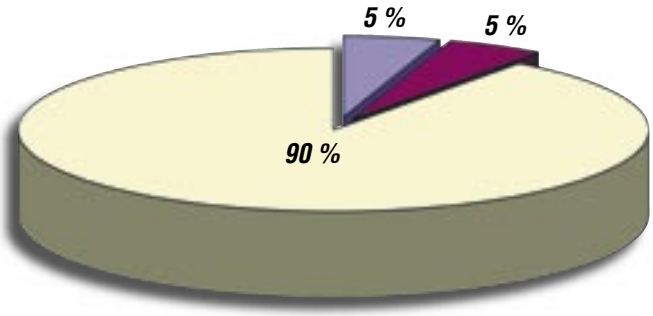
Highest energy efficiency and lower Life Cycle Costs

Over a ten year operating period, energy costs equate to 90% of the total Life Cycle Costs (LCC); the actual equipment costs play a secondary role.

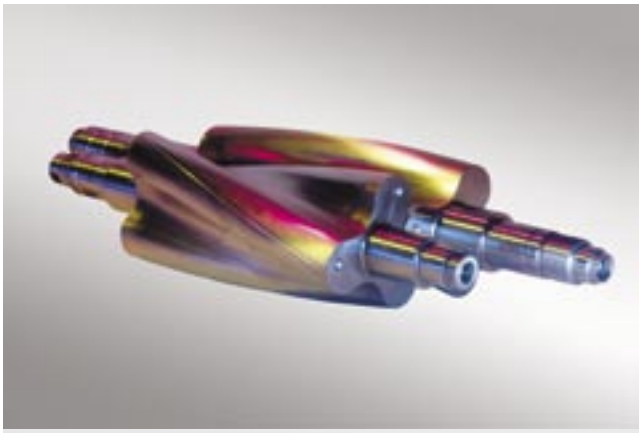
With this in mind, the Delta Hybrid was developed with the focus on increasing energy efficiency and achieving a significant reduction of energy costs and greenhouse gas emissions.

The ideal union of both rotary lobe blower and screw compressor technologies resulted in the Delta Hybrid, a future-oriented innovation that reduces the energy consumption by up to 15% compared to usual compressors.
A 3 + 3 twisted rotor profile is used for low pressures up to 800 mbar (12 psi) whereas a 3 + 4 rotor profile is used for pressures up to 1500 mbar (22 psi): a compressor with optimum efficiency can be selected for the needed pressure range.

Optimized fluidic design of inlet and discharge ports provides for ideal flow conditions and reduced slippage.
Moreover, the belt-driven Delta Hybrid offers the significant advantage of exact sizing: the greatest advantage comes from the energy that does not need to be used. In other words, a 5% excess in volume flow corresponds to a 5% higher energy use.



Average operating costs of an air mover over 10 years:
energy *initial cost* *maintenance*



3+3 rotor profile with twisted rotors and patented pulse charging as well as low squeeze losses.

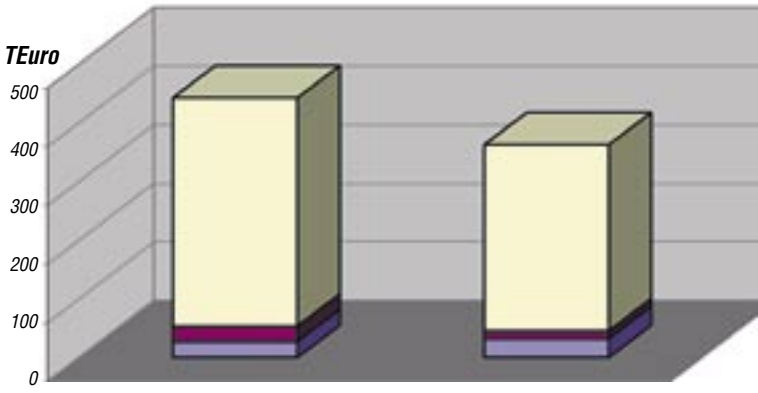
Especially developed 3+4 rotor profile with internal compression for low pressure applications.

Delta Hybrid

Further measures that improve energy efficiency:

- Very wide flow control range from 25% to 100%
- Inlet cone that reduces pressure losses (patent pending)
- Optimal air flow within the acoustic enclosure, brings cool air to the intake side and increases compression efficiency
- Silencer without absorption material and with reduced pressure losses (patent pending)
- Shaft-driven or electric motor driven ventilation fan for the acoustic enclosure
- Special silencer insulation reduces the temperature within the acoustic enclosure and contributes to an increase of compression efficiency
- Highly efficient motors EFF1/IE2 motors (Standard) or Premium Efficiency/IE3 motors (Option)
- Power fluctuations even under varying inlet temperatures (summer/winter operation) are minimal compared to turbo compressors.

LCC comparison GM 60 S / D 62 S for 5 years of continuous operation: *energy* *initial cost* *maintenance*

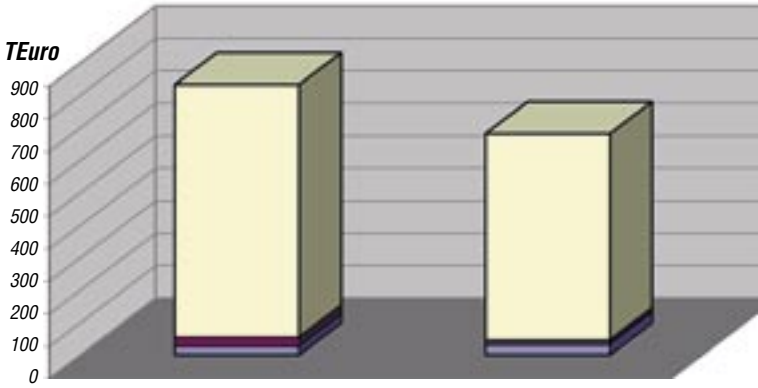


GM 60 S (motor 110 kW) ***D 62 S (motor 90 kW)***

Operating data: 52 m³/min, 900 mbar delta p, 8000 O.H./year

Saving of some Euro 80K; ROI = 2 years

LCC comparison GM 60 S / D 62 S for 10 years of continuous operation: *energy* *initial cost* *maintenance*



GM 60 S (Motor 110 kW) ***D 62 S (Motor 90 kW)***

Operating data: 52 m³/min, 900 mbar delta p, 8000 O.H./year

Saving of some Euro 150K; ROI = 2 years

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Space saving, easy to use and reduced maintenance costs

In the design phase of the Delta Hybrid, much importance has been given to reducing maintenance costs:

- Ease of transportation with hand truck or forklift truck
- Integrated service kit with motor lifting jack, filling funnel and first oil fill
- The front side is used for operation and maintenance
- Fully automatic and maintenance-free belt tension provided by hinged motor support base
- Oil level can be monitored from the outside during operation, without interrupting production
- Increased bearing life to over 60 000 hours (at 1000 mbar (15 psi) differential pressure)
- Extension of oil change intervals to 16 000 operating hours (when using Aerzen oil Delta Lube). No need for a first oil change (for example after the first 500 O.H.)

Expanded operating- and increased pressure range

By design, conventional rotary lobe blowers are limited to a differential pressure of 1 bar (15 psi). When it comes to higher pressures, other types of compressors are used. These are often designed for significantly higher pressures and at higher initial investment.

The new Delta Hybrid now closes this gap with a differential pressure capability of 1.5 bar (22 psi). Vacuum operation can now be extended from -500 mbar (-15“Hg) to -700 mbar (-21“Hg).

In addition, the discharge temperature limit of the Aerzen Rotary Lobe Compressor has been increased. The Delta Hybrid provides higher reliability under high ambient temperatures and high differential pressures in positive or negative pressure applications; it can now operate safely at discharge temperatures of 160 to 180 °C (320 to 356ºF).

Delta Hybrid

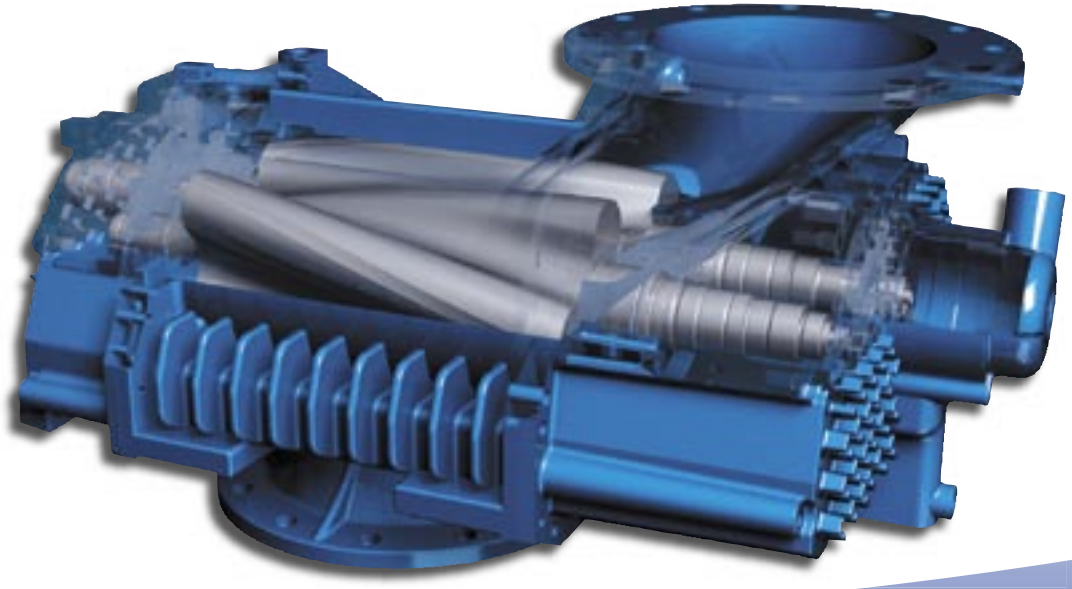
Low noise levels, without absorption material

Aerzen already set new low machine noise emission standards with its previous Delta Blower Generation 5. The same levels can of course be reached with the Delta Hybrid that is also characterized by further developments:

- new pulsation reduction in the compressor stage
- silencer without absorption materials (patent pending)
- additional insulation
- inlet cone to further reduce inlet noise (patent pending)
- optimized acoustic enclosure

Additional advantages of the Delta Hybrid include:

- Space-saving design suitable for “side-by-side“ installation
- Discharge silencer designed as spark arrestor certified for ATEX-applications
- PED pressure-vessel guidelines approval (discharge silencer and pressure safety valve)
- Same pipe connections as Delta Blower Generation 5



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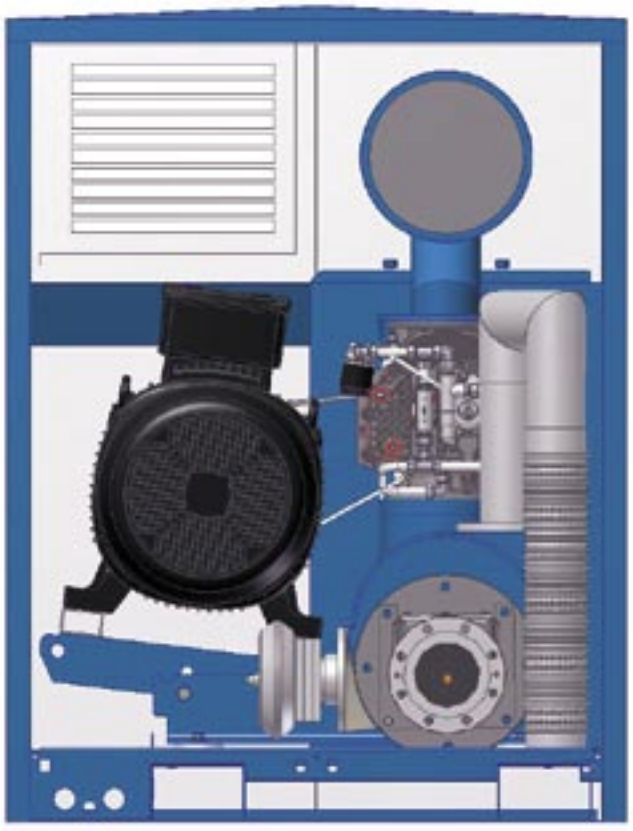
Delta Hybrid

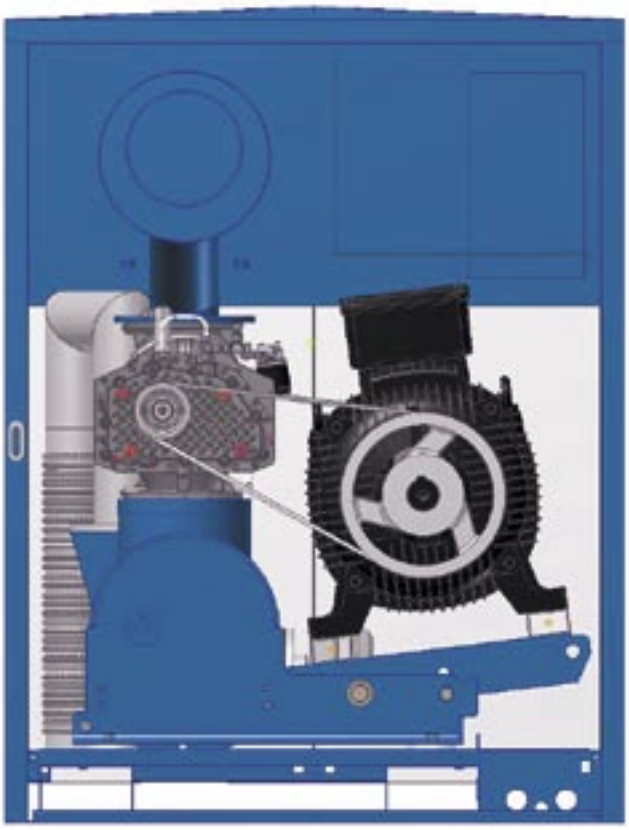
Scope of supply:

- Newly designed Rotary Lobe Compressor
- Discharge silencer integrated in base frame
- Combined filter and silencer with inlet cone
- High efficiency electric motor
- High-performance belt drive
- Hinged motor plate
- Connecting housing with check valve
- Pressure safety valve
- Flexible pipe connector with clamps / or flanged expansion joint

Accessories:

- Acoustic enclosure for indoor or for outdoor installation
- Cooling fan: shaft or electric motor driven
- Start unloading
- Aerzen controller AERtronic or gauges





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Modifications and upgrades:

- ATEX certification
- ASME, GOST, China License certification
- All-in-one-solution with integrated starter panel
- Separte control panel
- Frequency inverter
- Other accessories on request

Aerzen controller AERtronic

The new Aerzen AERtronic controller is based on a modular design approach and offers a solution tailored to each individual application. The controller includes an intuitive touch screen, the base module as well as application dependent add-on modules. All measured operating data are retrievable and parameters adjustable in a user-friendly menu structure. The base unit used across the Aerzen product range includes the following features: processor unit, oil level control, inlet and discharge pressure, motor temperature and speed, three free digital inputs, a relay output, and bus communication interface with control panel and expansion modules.

The expansion module offers three digital inputs and three relay outputs as well as inputs for temperature and pressure measurements (for example oil temperature, compressor outlet temperature, oil pressure). Additional digital inputs, relay outputs, Pt 1000 and analogue inputs and outputs for pressure or temperature control with use of a VFD, as well as bus interface for communication with a master controller or other systems and for data communication can be provided with additional application-related expansion and special modules.

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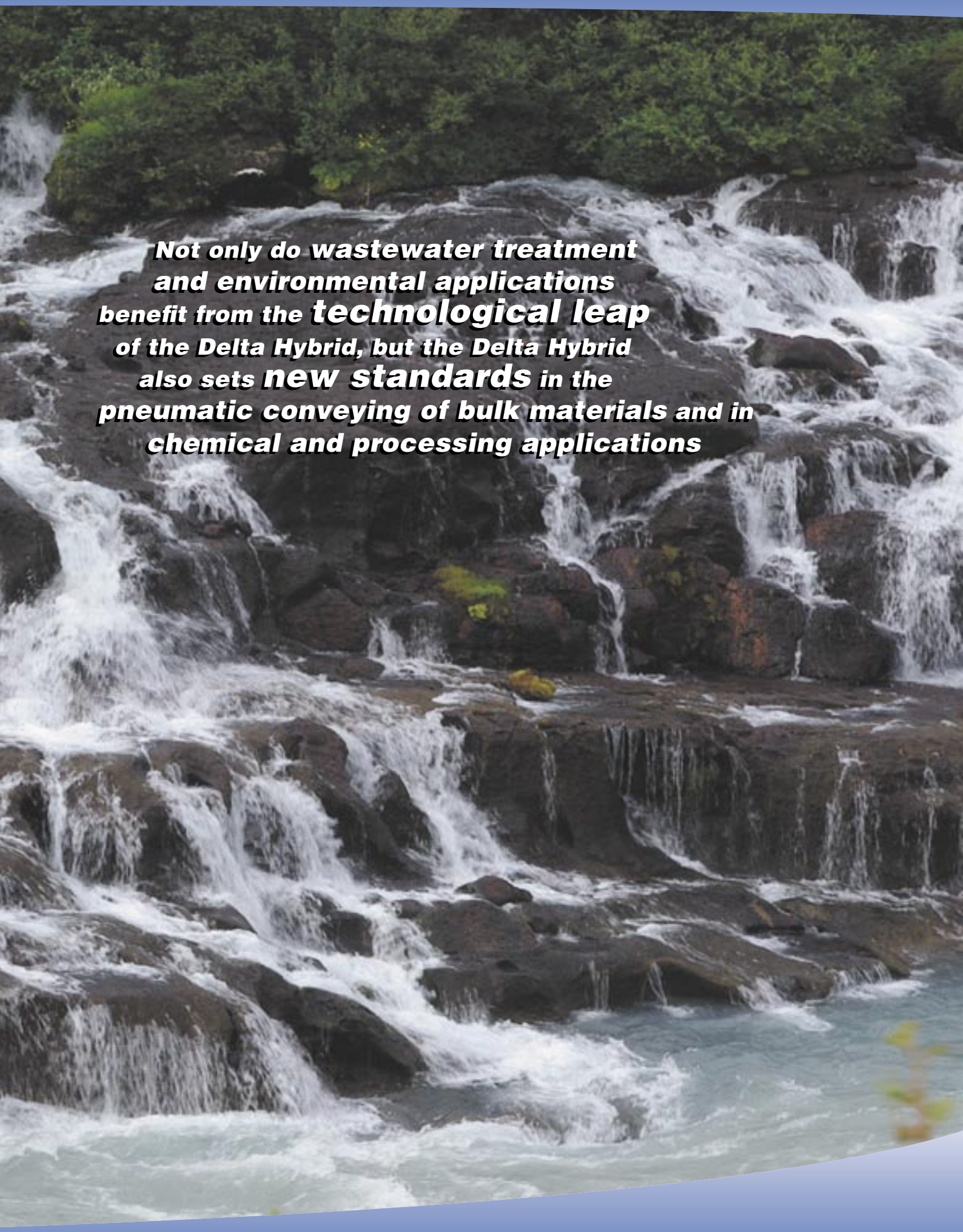
Delta Hybrid



Not only do wastewater treatment and environmental applications benefit from the technological leap of the Delta Hybrid, but the Delta Hybrid also sets new standards in the pneumatic conveying of bulk materials and in chemical and processing applications

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Typical applications

The new Aerzen Rotary Lobe Compressor packages have been designed for oil free compression of air and neutral gases. The Delta Hybrid is currently available for positive pressure and vacuum applications in the range of nominal nozzle sizes DN 100 to DN 250 (4 in. to 10 in.). Further sizes and designs are under development. A flexible modular concept enables the combination of multiple machine and motor sizes within a nominal package size. When equipped with the most suitable belt drive, the current performance requirement can be met most closely while enabling possible later easy adjustments.

The new Delta Hybrid series covers a flow range of 110 m³/h to 4.100 m³/h (65 to 2400 cfm) with 12 machine sizes and for positive pressures (depending on the size) up to 1500 mbar g. (22 psig) and vacuum to -700 mbar (-21”Hg).

Examples of varied applications include

- Pneumatic conveying of bulk materials
- Wastewater treatment
- Drinking water treatment
- Aeration of waterways and lakes
- Chemical and process applications
- Production of paper and glass
- And many more

Performance data

Nomenclature:

Example:
D 62 S

Style:
H = high differential pressures to 1500 mbar (22 psi)
S = short, differential pressures to 1000 mbar (15 psi)
L = long, differential pressures to 800 mbar (12 psi)

Max. Volume flow in m³/min (approx.)

Rotary Lobe Compressor

Positive pressure

Size	Differential pressure		Volume flow		Motor power		Noise pressure level *
	max. mbar	max. psi	max. m³/h	max. cfm	max. kW	max. HP	max. dB(A)
D 12 H	1500	22	670	390	37	50	73
D 12 S	1000	15	690	410	30	40	72
D 17 L	800	12	810	480	30	40	66
D 24 H	1500	22	1370	810	75	100	76
D 24 S	1000	15	1390	820	55	75	74
D 28 L	800	12	1340	790	45	60	70
D 36 H	1500	22	2100	1240	110	150	76
D 36 S	1000	15	2150	1270	75	100	76
D 46 L	800	12	2350	1380	75	100	70
D 62 H	1500	22	3400	2000	160	200	81
D 62 S	1000	15	3500	2060	110	150	79
D 75 L	800	12	3870	2280	132	175	77

* Machine emitted noise with acoustic enclosure and with connected and insulated piping, tolerances ± 2 dB(A)

Vacuum

Size	Differential pressure		Volume flow		Motor power		Noise pressure level *
	max. mbar	in. Hg	max. m³/h	icfm	max. kW	HP	max. dB(A)
D 12 S	-700	-21	650	380	18,5	25	72
D 17 L	-600	-18	800	470	22	30	65
D 24 S	-700	-21	1320	780	37	50	73
D 28 L	-600	-18	1350	790	30	50	70
D 36 S	-700	-21	2000	1180	55	75	76
D 46 L	-600	-18	2300	1350	55	75	77
D 62 S	-700	-21	3300	1940	90	125	79
D 75 L	-600	-18	3850	2270	90	125	75

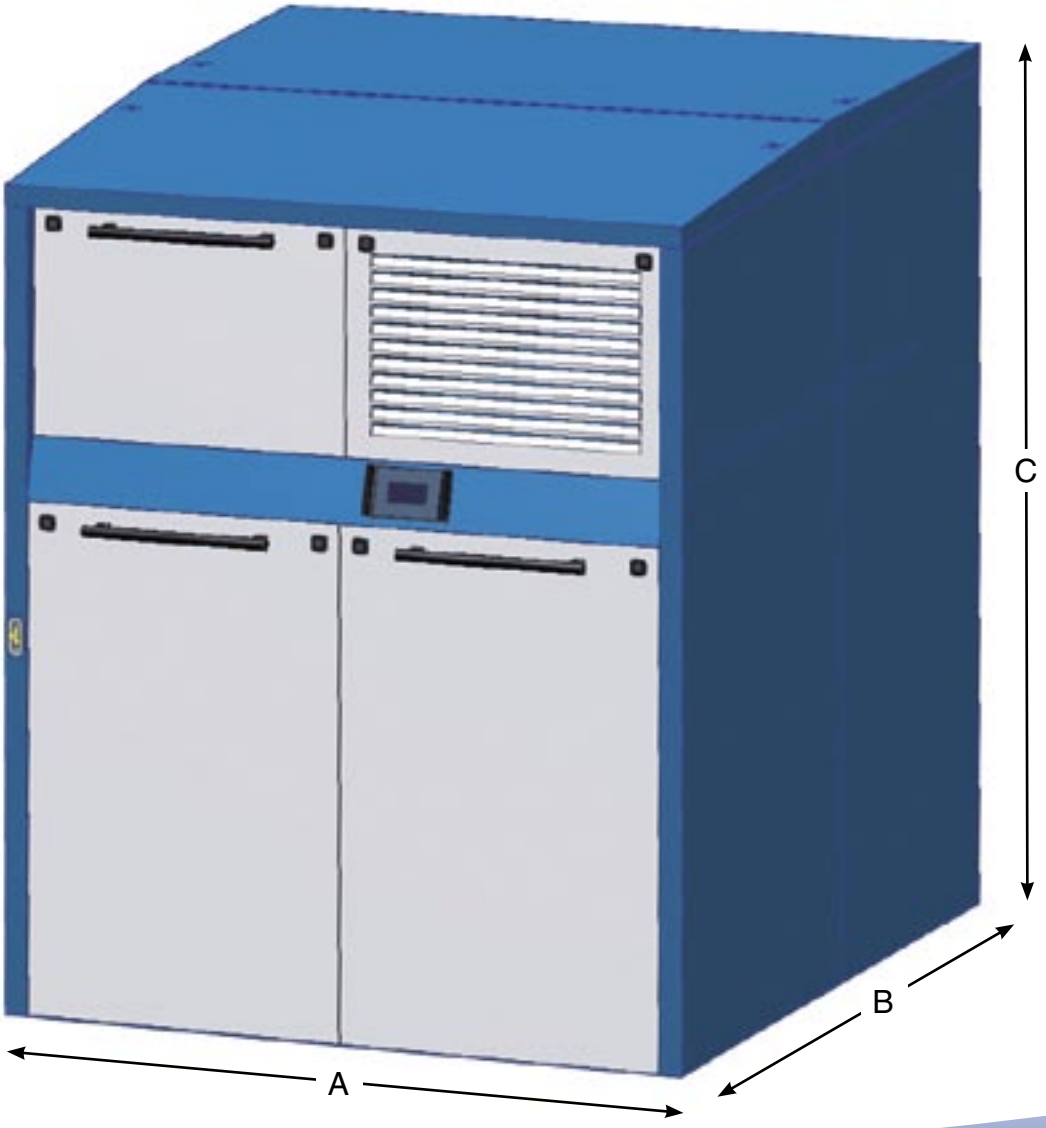
* Machine emitted noise with acoustic enclosure and with connected and insulated piping, tolerances ± 2 dB(A)

Dimensions and weights

Size	Width A		Depth B		Height C		Nozzle size DN		Weight *	
	mm	in.	mm	in.	mm	in.	(mm)	(in.)	approx. kg	approx. lbs
D 12 H / S	1250	49,2	1350	53,1	1500	59,1	100	4	590	1301
D 17 L	1250	49,2	1350	53,1	1500	59,1	100	4	600	1323
D 24 H / S	1250	49,2	1350	53,1	1500	59,1	125	5	635	1400
D 28 L	1500	59,1	1800	70,9	1980	78	125	5	1026	2262
D 36 H / S	1500	59,1	1800	70,9	1980	78	150	6	1098	2421
D 46 L	1700	66,9	2055	80,9	2111	83,1	150	6	1305	2878
D 62 H / S	1700	66,9	2055	80,9	2111	83,1	200	8	1400	3087
D 75 L	1900	74,8	2200	86,6	2345	92,3	250	8	2015	4443

Dimensions expressed, not binding

* Weight without motor



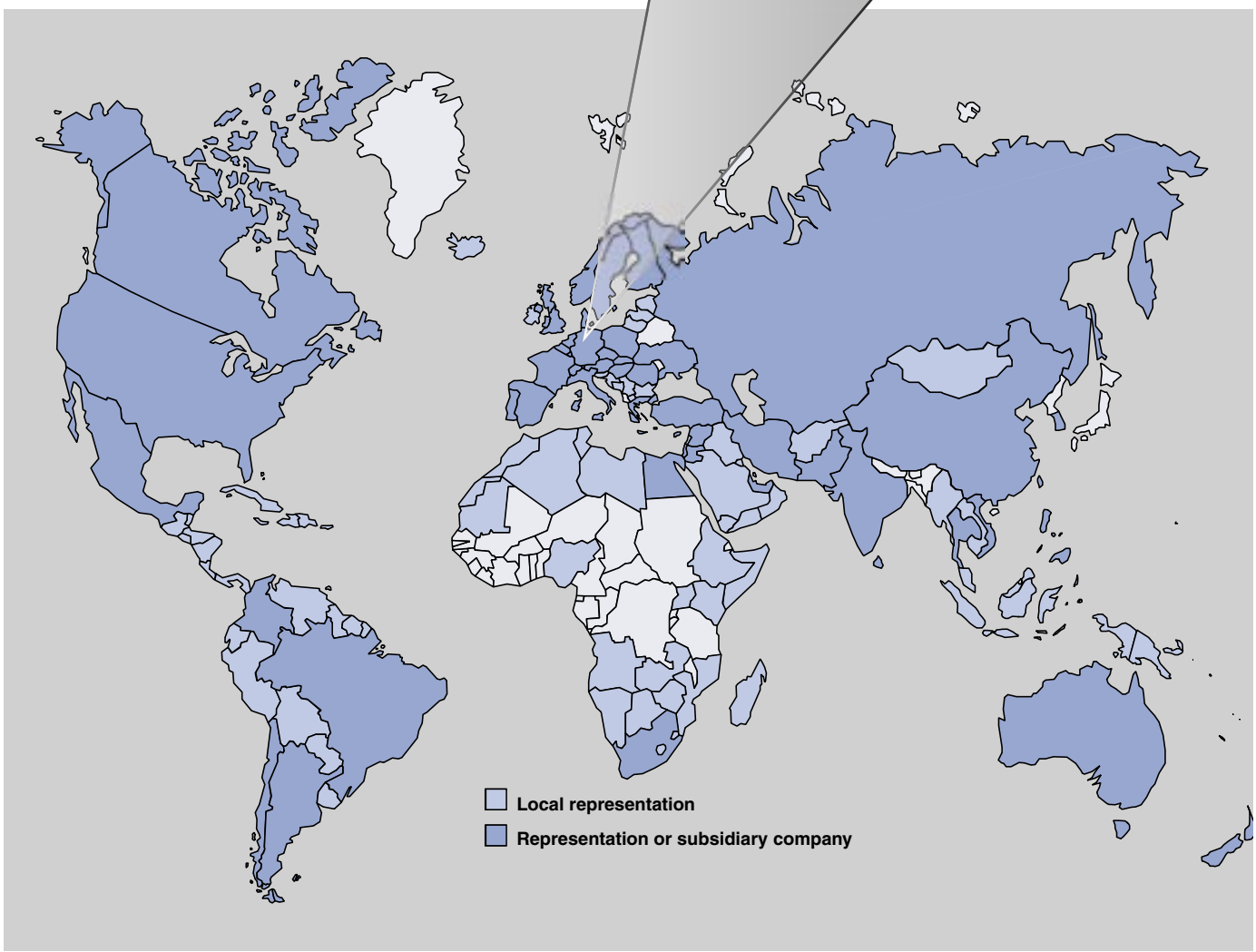
A good address - everywhere

Customer closeness through local presence is one of Aerzen's principles for Customer Support.

- 6 sales offices in Germany
- 1700 employees worldwide
- over 30 international subsidiary companies
- representations for over 100 countries
- more than 100 service technicians on all continents

are the assurance of competent local support partners who communicate in the national language.

For local contacts, see our website:
www.aerzen.com



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