

# Standardised solutions for process gases



**AERZEN**  
EXPECT PERFORMANCE

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# Reliable and standardised solutions

## Your partner for the process gas applications of tomorrow

### For the sake of the environment

The realisation of the 2050 climate target is accompanied by comprehensive transformation processes worldwide and in all areas of the economy, society and politics. The change from the use of fossil fuels to climate-neutral energy sources is indispensable in order - as stipulated by the global community in the Paris Agreement of 2015 - to push global warming well below the 2 °C mark and to stop the negative consequences of climate change there. Increasing energy efficiency and alternative CO<sub>2</sub>-neutral processes for energy production, processing and use are gaining in importance worldwide. There are plenty of opportunities in this transformation process - but it also poses major systemic and technological challenges for the industrial sectors concerned.

We provide answers to the emerging questions of the energy transition, such as these:

- Which procedures will become relevant in the future?
- How can modern compressor packages support the transformation process?
- What are the benefits of standardised solutions for productivity and business success in global markets?

Find out on the next few pages how you can meet the challenges of climate change in your gas engineering processes with high performance - ecologically and economically.

### Technologies of the future - Made by AERZEN

On the road to a climate-neutral future, AERZEN accompanies its partners with the expertise of one of the world's leading specialists in the compression and conveying of gases. Dealing with the complexity of this pumped medium and with increasingly "green" synthetic gases requires technical solutions that are reliable and highly economically adaptable to changing requirements. In all areas of industry. Specially developed for these applications, AERZEN offers a wide range of blower and compressor packages. A standardised portfolio, including integrated modifications for the respective gases or mixtures. Each of these packages incorporates our know-how from over 150 years of company history and our decades of experience in the gas technology requirements of our partners worldwide.



## LET'S TALK

"... about **resource-saving** and **efficient** aeration of your aeration tanks."



# Application ranges

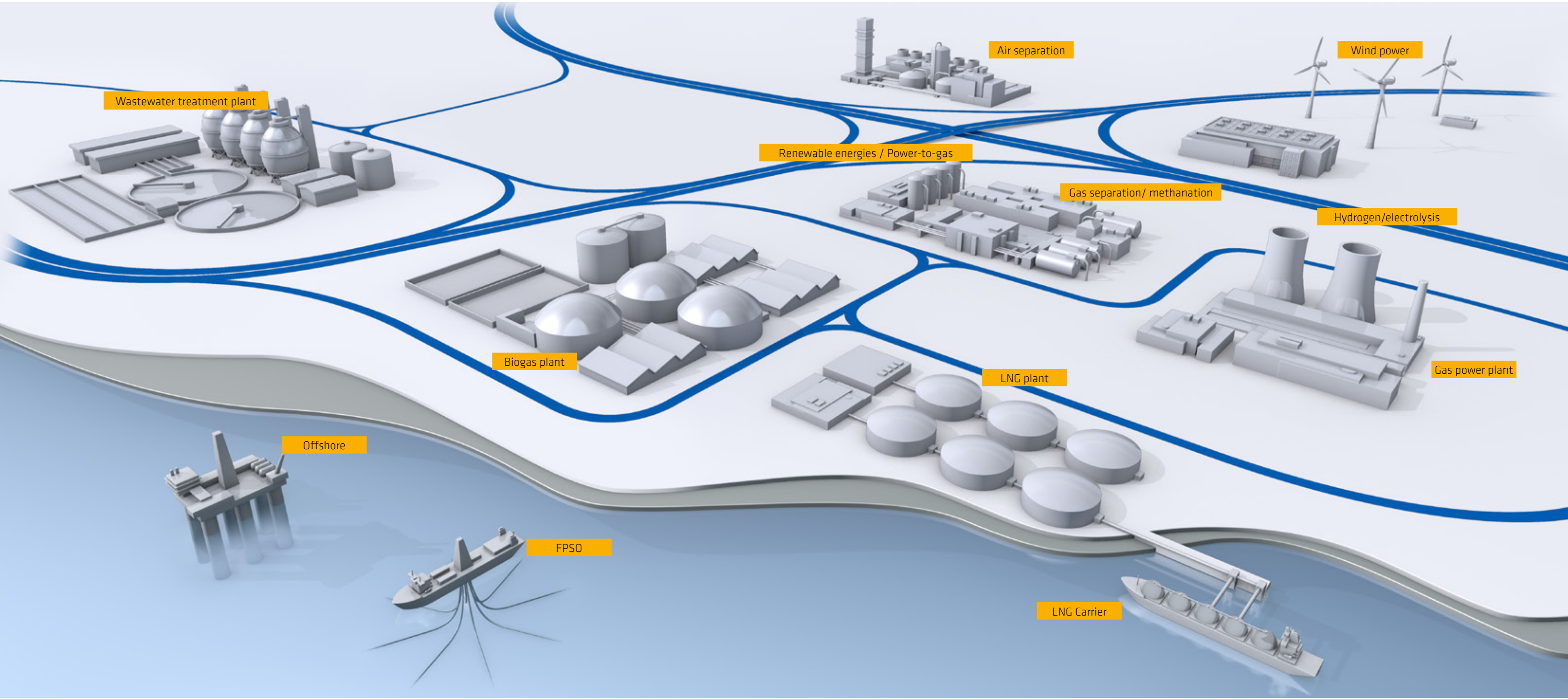
## A wide range of applications



### Gas types - diverse conveying media in industrial processes

AERZEN offers an exceptionally wide range of standardised blower and compressor designs. Our compressors and blowers are tailored to almost all industrial applications in which a wide variety of gases are compressed.

- ✓ Biogas & Biomethane
- ✓ Sewage gas & Landfill gas
- ✓ Natural gas
- ✓ Coal Seam Gas
- ✓ Boil-off gas in LNG applications
- ✓ Hydrogen
- ✓ Associated petroleum gas
- ✓ Synthesis gas
- ✓ Flare gas
- ✓ Other industrial gases such as
  - Noble gases
  - Nitrogen
  - Helium
  - and many more





# Challenge gas applications

## Safety in your process

Compressor and blower packages Made by AERZEN have always been used in a wide range of processes. The know-how and experience we have built up here over decades in all areas of application prove their worth especially where flammable and toxic gases are conveyed. AERZEN offers you an exceptional range of solutions with its product portfolio. Economical high-efficiency machines with which you can meet even the highest requirements for safety and system availability.



### Reliability as standard:

Compressors for ATEX applications

AERZEN products are designed to be ATEX compliant. Specially developed for a wide range of processes, a standardised package concept is available to you. Easily and economically adaptable, it offers you maximum safety. For operating approval (e.g. by the TÜV), AERZEN supplies you with all the documents required for acceptance. Your individual requirements for the package design are comprehensively checked for compliance with the ATEX Directive 2014/34/EU and executed accordingly by our project engineers. Standardised ATEX solutions from AERZEN are of course subject to the highest quality requirements of our company. And they also offer you other important advantages, for example these:

- Comprehensive advice from the AERZEN competence team
- Conformity to ATEX Directive 2014/34/EU
- Complete and clear documentation
- Compliance with legal requirements
- Complete solutions from a single source

All blowers and compressors are designed for both external explosion protection zone I and II. Furthermore, in addition to the relevant requirements according to the Machinery Directive and CE marking, including the latest safety standards EN1012-3 (Compressors and Pumps) for process gas compressors and vacuum pumps, the packages of course also fulfil very different local specifications, such as the DVGW regulations for Germany.

### Explosion groups and temperature classes.

Temperature classes		T1	T2	T3	T4	T5	T6
Ignition range of the explosive mixture			300 – 450 °C	200 – 300 °C	135 – 200 °C	100 – 135 °C	85 – 100 °C
max. surface temperature		450 °C	300 °C	200 °C	135 °C	100 °C	85 °C
Explosion groups for gases	I	Methane					
	II A	Acetone, Ammonia, Methane, Methanol, Propane, toluene	Ethyl alcohol, n-butane	Diesel, petrol	Acetaldehyde, Ethyl ether		
	II B	Town gas (illuminating gas)	Ethylene	Hydrogen sulphide			
	II C	Hydrogen	Acetylene				Carbon disul-fide
Explosion groups for dusts	III A	combustible fluff					
	III B	Non-conductive dust with specific electrical resistance > 10 <sup>3</sup> Ωm => el. equipment must be protected to at least IP 5x					
	III C	Conductive dust with specific electrical resistance < 10 <sup>3</sup> Ωm => el. equipment must have protection class IP 6x => the requirements of the next higher zone apply (zone 22 becomes zone 21)					

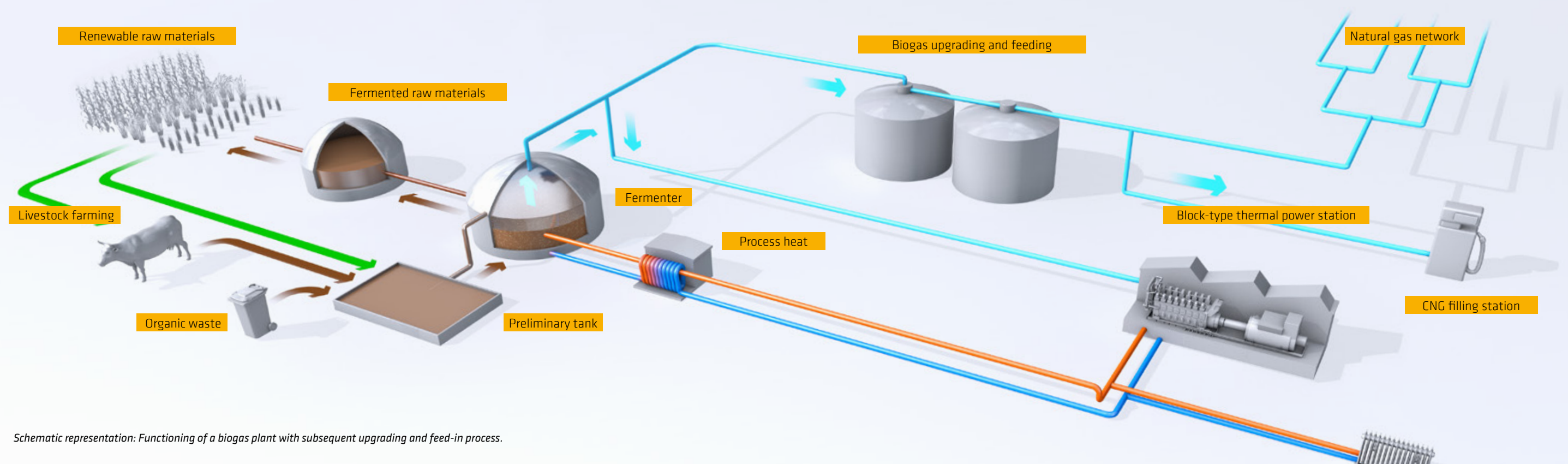
\* Defined by the application of the equipment and equipment components



# Biogas and biomethane

## Energy resource for present and future

Biogas plants for electricity and heat generation or for biogas upgrading are important technologies in today's energy production. After all, biogas is climate-neutral - it only releases as much CO<sub>2</sub> as was previously bound by the plants. With an application-specific portfolio of standardised solutions, AERZEN is a crucial building block in your process.



Schematic representation: Functioning of a biogas plant with subsequent upgrading and feed-in process.

### Biogas - an important component of the energy transition

Biogas plants convert organic material into biogas containing methane. Not only plant and animal residues are used as raw materials, but also leftovers from the food industry. Microorganisms decompose the biomass in the fermenter into gas containing methane. The resulting raw biogas can be fed into the BTPP after appropriate desulphurisation. Or it is cleaned of CO<sub>2</sub> and other impurities in a further processing step and fed into the natural gas grid as processed biomethane, for example.

### AERZEN blowers and compressors for your special applications

AERZEN offers a tailor-made portfolio of single-stage, oil-free or oil-injected screw compressors to suit the different suction and discharge pressures and processes required. When generating upstream pressure in BTPPs or biogas upgrading plants or as feed-in compressors in biogas feed-in plants, you can achieve final pressures of up to 24 bar (g) with the packages of the VMX to VMY series. A particular advantage of the AERZEN biogas blowers is the TÜV-certified explosion pressure

shock resistance up to 12 bar, which counteracts the possible flammability of the gas. This means that the operation of these machines is also permitted in your processes with internal ATEX zone 1. Biogas packages are technically gas-tight, because they are based on a concept of clear separation of the interior of the package and the environment. A relevant safety aspect for your processes. And all this with maximum energy efficiency, system availability and ease of maintenance - typically AERZEN.



# Power-to-gas

## With methanation to a CO<sub>2</sub>-neutral environment

As a globally active company, AERZEN also makes a major contribution to climate neutrality. We counter this with our own sustainable processes or procedures and by developing increasingly energy-saving, economically feasible technologies. AERZEN machines are today High-Efficiency solutions. Modified as standard for forward-looking gas applications, for example power-to-gas methanation.

### Key element hydrogen

Climate-friendly produced hydrogen H<sub>2</sub> is considered a key element for the energy transition. It can be used in a variety of ways to reduce CO<sub>2</sub> emissions by up to 40 percent in the short term - in the long term, a savings potential of up to 90 percent is assumed. In the process, water is split into hydrogen and oxygen by electrolysis. The "green" gas is then available for a variety of uses. From feeding it into the existing gas grid to using it as fuel for vehicles. As a fuel substitute for coal and coke, hydrogen will play an increasing role in steel production

in the future. However, H<sub>2</sub> can also be used to produce natural gas through methanisation and then liquefied. These PtG or PtL processes contribute to greenhouse gas reduction in all sectors.

### Methanation - the path to green natural gas

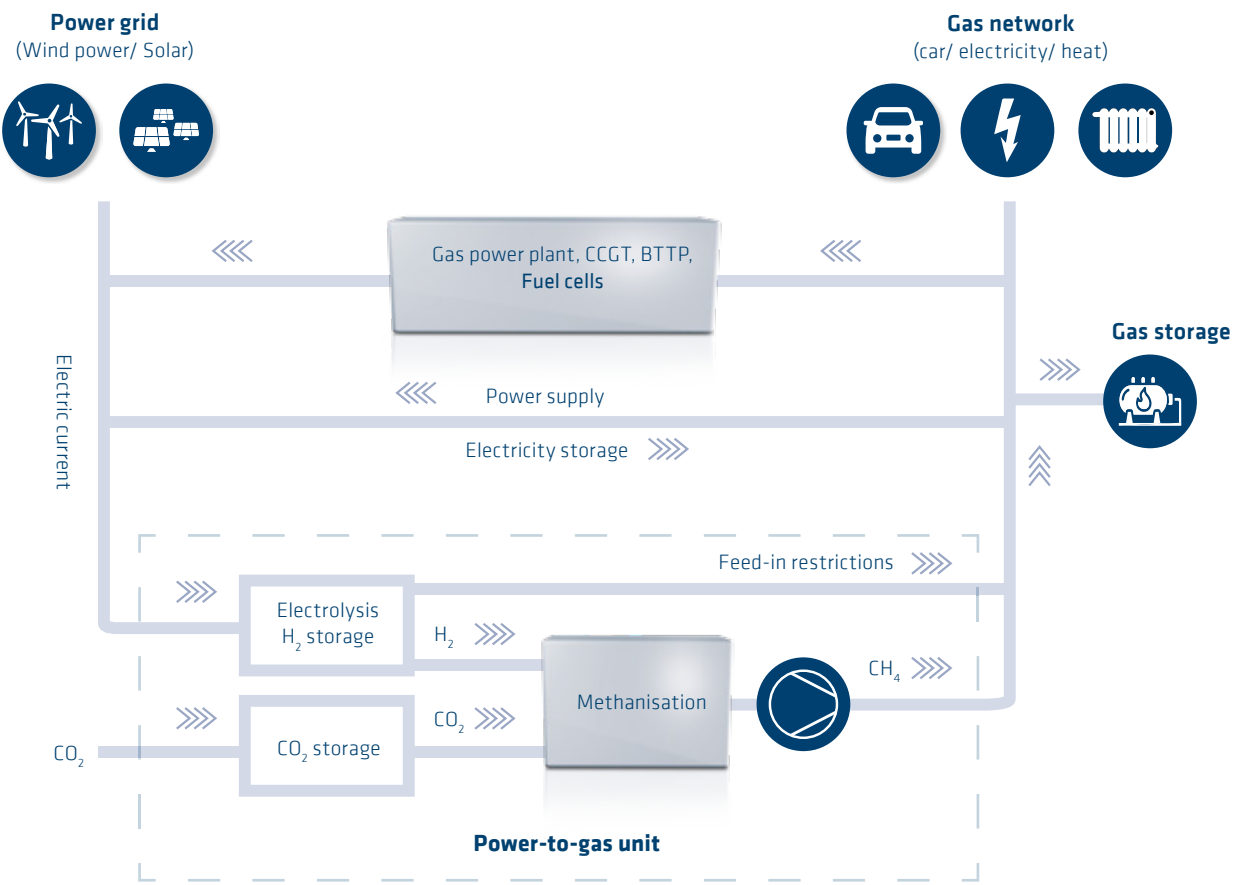
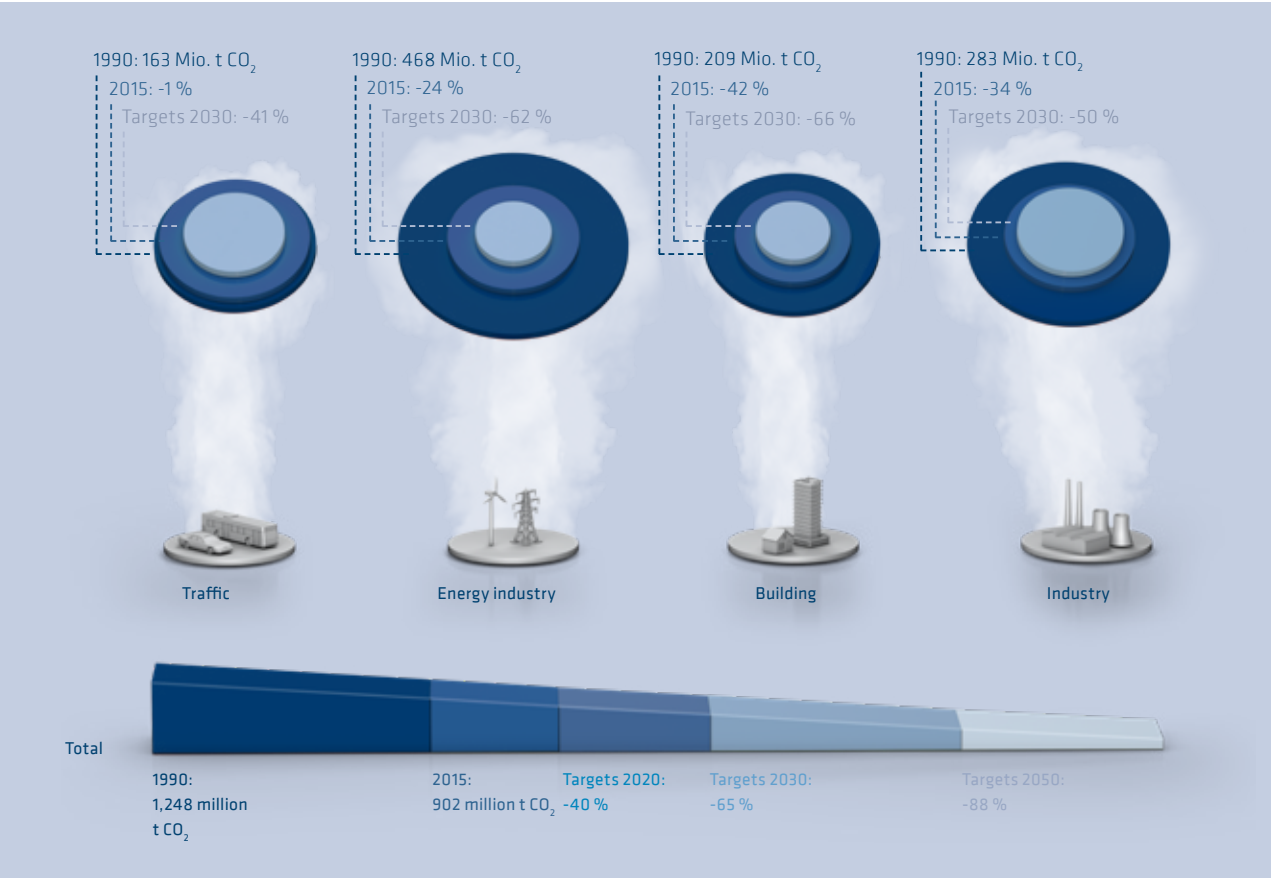
In the process of methanisation, hydrogen H<sub>2</sub> and carbon dioxide CO<sub>2</sub> combine to form methane CH<sub>4</sub> - a highly energetic energy

carrier with natural gas quality. Like its fossil equivalent, methane can be stored, used as needed for heat, industry, households or mobility, or fed into the existing natural gas grid. Methanation becomes useful in all industrial processes that produce carbon monoxide or dioxide. Instead of releasing CO<sub>2</sub> into the environment, it can be stored and used to increase methane yield.

### Meeting the challenges successfully

The fact that hydrogen can be used for energy supply or in fuel cell systems is not new and is being promoted politically by the federal government's hydrogen strategy, among other things. What is missing so far is the creation of large-scale industrial production to generate sufficient quantities of the green gas. With its contemporary products and cross-industry experience, AERZEN is your partner when it comes to jointly overcoming previous barriers and sustainably harnessing the great potential of hydrogen.

Sustainability has many facets for us at AERZEN. An important one is continuity. For over 150 years, we have been your partner in almost every country in the world. Leading with product solutions that have always stood for the highest level of process and system safety and that deliver exceptional performance in terms of durability and longevity. This reliability forms the basis of trust for long-term business relationships. This is the only way to develop the custom-fit industrial solutions that will accompany you on an economical and safe path into the coming decades.



# Maritime applications

## Environmentally friendly solutions for fossil fuels

New regulations, for example on cleaning ballast water, reducing the sulphur content in fuel and in ships' exhaust gases, or the use of alternative fuels, contribute to better protecting the marine environment. Shipping, once one of the polluters par excellence, is now required by law to make important contributions to this end in order to protect the environment. We support you in this. On- and offshore.

### Recovering boil-off gas from LNG tanks

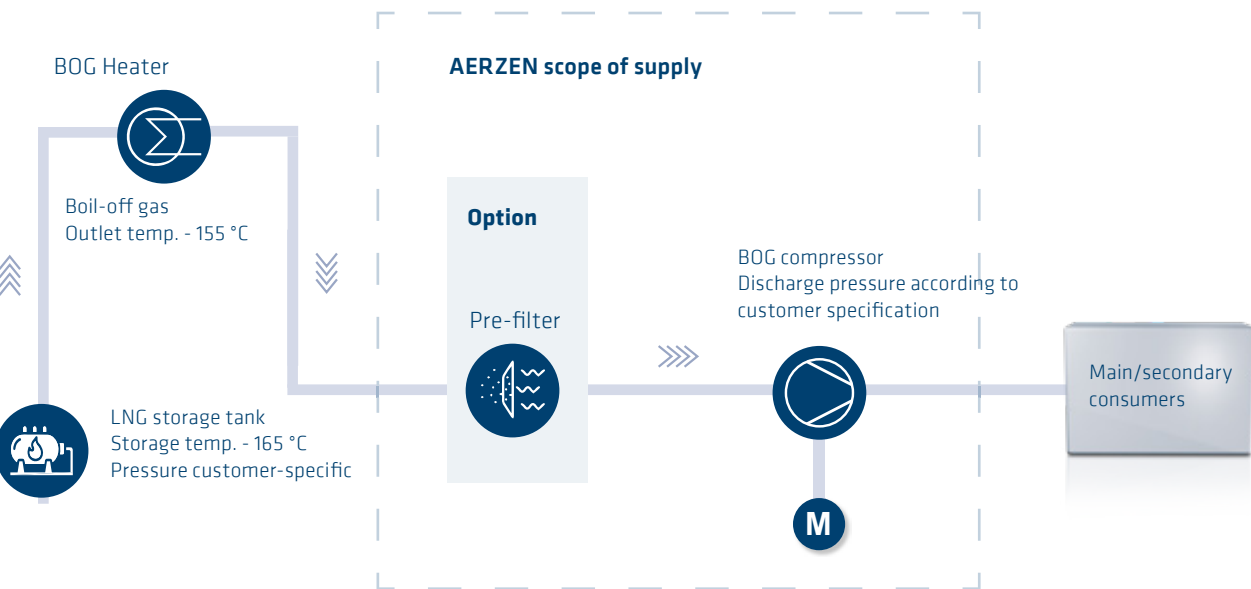
LNG (liquified natural gas) has only 1/600 of its gaseous volume and correspondingly great advantages for transport and storage. During transport, however, some of the liquefied LNG evaporates due to heating - so-called boil-off gas (BOG) emerges. To prevent the gas tank from bursting, it must be extracted. In a suitable compression process, this boil-off gas is liquefied again and returned to the tank as LNG. However, it can also be used as fuel and thus enables climate-friendly drive, for example of LNG tankers, cruise ships or ferries.

AERZEN compressors have been used in the marine industry for many years. Of course, they comply with the applicable safety guidelines of the various classification societies, such as those of DNV, LR, RINA and many others. In addition to the



Tilting test to prove safe operation even in wave conditions.

Made by AERZEN quality promise, this is an important contribution to maximum safety at sea.

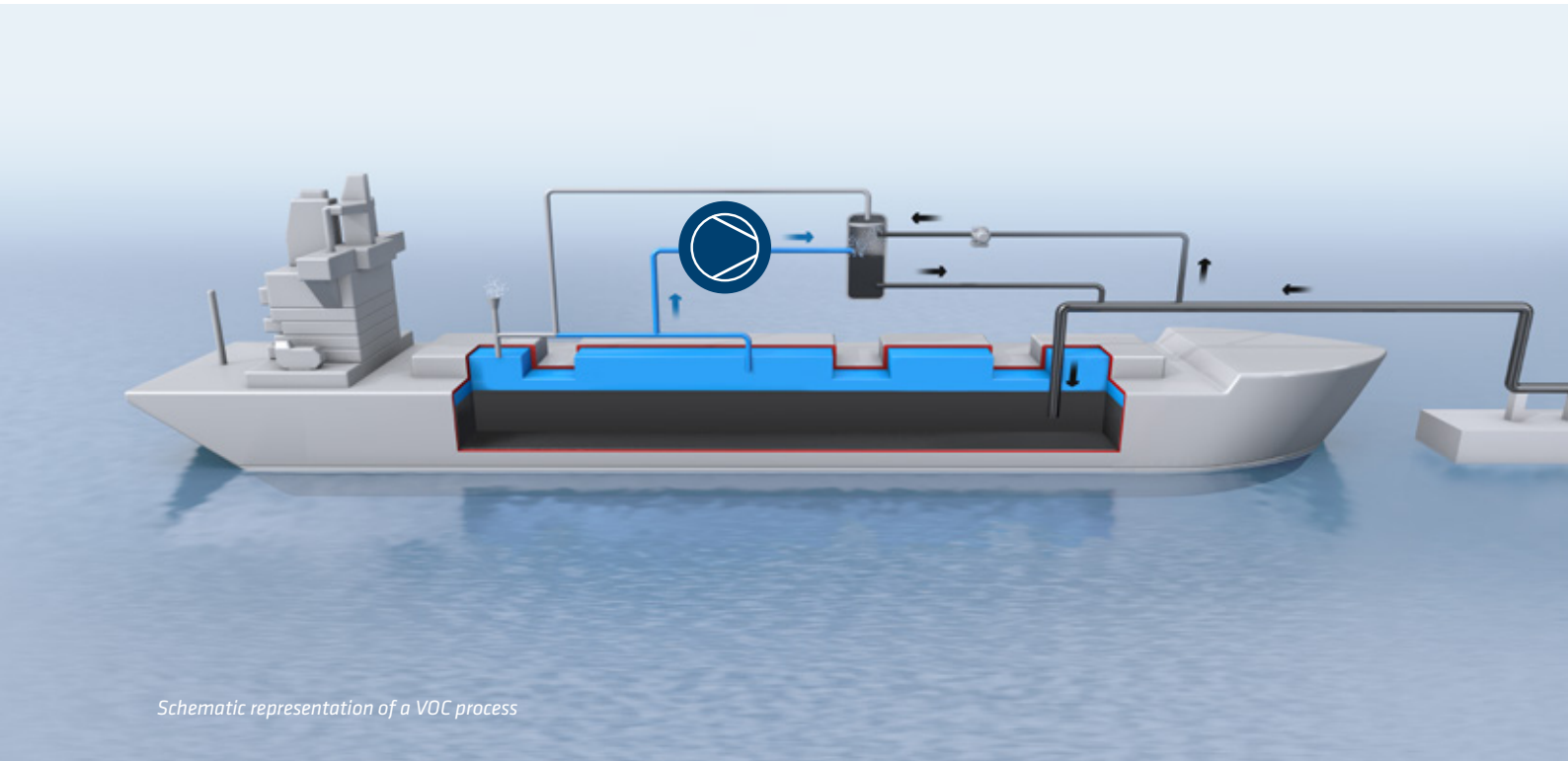


### VOC and Vapour Recovery

When tankers are loaded and unloaded with crude oil, environmentally harmful substances - volatile organic hydrocarbon compounds (VOCs) - are released into the atmosphere. They increase the greenhouse effect and contribute to the formation of ground-level ozone and other photochemical reaction products. Economically, however, they are one thing above all: An often unused energy potential.

The VOC recovery system on board allows these substances to be compressed, reliquefied and fed into the crude oil cargo in a two-stage process. But there are also other possible uses: The resulting liquefied gas can be stored under strict safety requirements and discharged on land or used as fuel for boilers or engines. Another application is the absorption of VOCs as part of the Vapour Recovery System. Here, the VOC is fed into an absorber column with the crude oil in a countercurrent process - the vapour in the bottom of the column, the crude oil as a side stream. The crude oil containing VOCs is then fed from the bottom of the column to the main crude feed and mixed in. For this process, oil pumps and compressors are used to pressurise oil and gas. Non-absorbed gases are passed

through the riser as inert gas to optimise recovery efficiency. The inert gas resulting in both processes can also be reused under strict regulations. Screw compressor packages made by AERZEN particularly developed for this process help to reduce the greenhouse effect. VOC units with AERZEN technology are used successfully on many tankships.



Schematic representation of a VOC process

# The AERZEN modular system

## Flexibility for your application

The AERZEN modular principle reflects our closeness to the application, more than 150 years of leading technological know-how and our unconditional claim to supply you with the best solution for your specific process gas applications. You can therefore expand the standard scope of delivery of our compressors and blowers almost at will. Standardised machines from AERZEN are highly individual. Tailor-made for each of your applications.



GM Positive Displacement Blowers - oil-free in 9 sizes

AERZEN positive displacement blowers of this series convey and compress drily. The symmetrical pistons rotate against each other without contact in a housing, so that no lubrication is required. Advantage: The conveying medium thus remains free from contamination by lubricants or abrasion. As it flows into the housing, the conveying medium - for example CH mixed gas - is conveyed to the discharge side by the rotating pistons. The suction volume flow can be flexibly regulated via a speed control. Due to the certified explosion pressure spike resistance of 12 bar, these blowers can also be used for the compression of air-gas mixtures that generate an internal ATEX zone 1.



Volume flows from  
30 to 2,700 m<sup>3</sup>/h



Raised intake pressure: 500mbar g  
final pressure: 1,000 mbar g



VM Screw compressor - oil-free in 7 sizes

Similar to the positive displacement blowers, the compressors also work with positive displacement conveying. They rely on the concept of internal compression with chambers that become smaller towards the discharge side. The compressor package type VM can compress single-stage CH mixed gases up to a final pressure of 3.5 bar g. It is directly driven and impresses with class 0 oil-free compression. The extensive range of accessories can be customised. Type VM packages are extremely energy-efficient, compact and low-maintenance across all 7 sizes.



Volume flows from  
300 to 8,000 m<sup>3</sup>/h



Raised intake pressure: 500 mbar g  
Final pressure: 3.5 bar g



### Your advantages at a glance:

- ✓ High quality materials and workmanship Made by AERZEN - it stands for robust machines and maximum process reliability
- ✓ Low maintenance and service effort ensures maximum availability in continuous operation
- ✓ Low life cycle costs for your sustainably economic investment
- ✓ Worldwide services and highly qualified teams of technicians ensure the longevity of your compressors and blowers
- ✓ Intelligent package design - you benefit from a compact, space-saving and easy-to-understand concept, based on the extensive range of accessories and the modular system



VMX Screw compressor - oil-injected in 5 sizes

The VMX compressors are also characterised by their variety of types, the modular principle, their extensive modification options tailored specifically to your requirements and the principle of internal compression - since 1943. The forced-feed screw compressors are convincing in tough everyday practice, are suitable for FIs and can be driven by electric motors. A final pressure of up to 16 bar g can be achieved in a single stage. In addition, these compressors also impress with their durability. With a minimum of wear parts and the absence of inlet and outlet valves, they are maintenance-free for up to 20,000 operating hours.



Volume flows from  
100 to 2,000 m<sup>3</sup>/h



Raised intake pressure: 500mbar g  
final pressure: 16 bar g



*Deviating data on request!*

VMY Screw compressor - oil-injected in 3 sizes

Compressors of the VMY series allow a final pressure of up to 24 bar g and permit a raised intake pressure of up to 8 bar g. This series also operates with forced internal compression, is suitable for FI and can be operated by an electric motor. This compressor series is also oil-injected with internal oil separation. Like the VMX series compressors, the VMY modular screw compressors offer a variety of different types and modification options.



Volume flows from  
150 to 2,600 m<sup>3</sup>/h



Raised intake pressure: 8 bar g  
Final pressure: 24 bar g



# Standard and modifications diversity in detail

The diverse range of applications of our standardised products in your various processes brings consistency and manageability to your machinery. The high availability and quality of our solutions in turn give you maximum process reliability - especially when it comes to explosion safety. The extensive modification options in our portfolio offer you scope for customisation down to the smallest details. Find out more here.

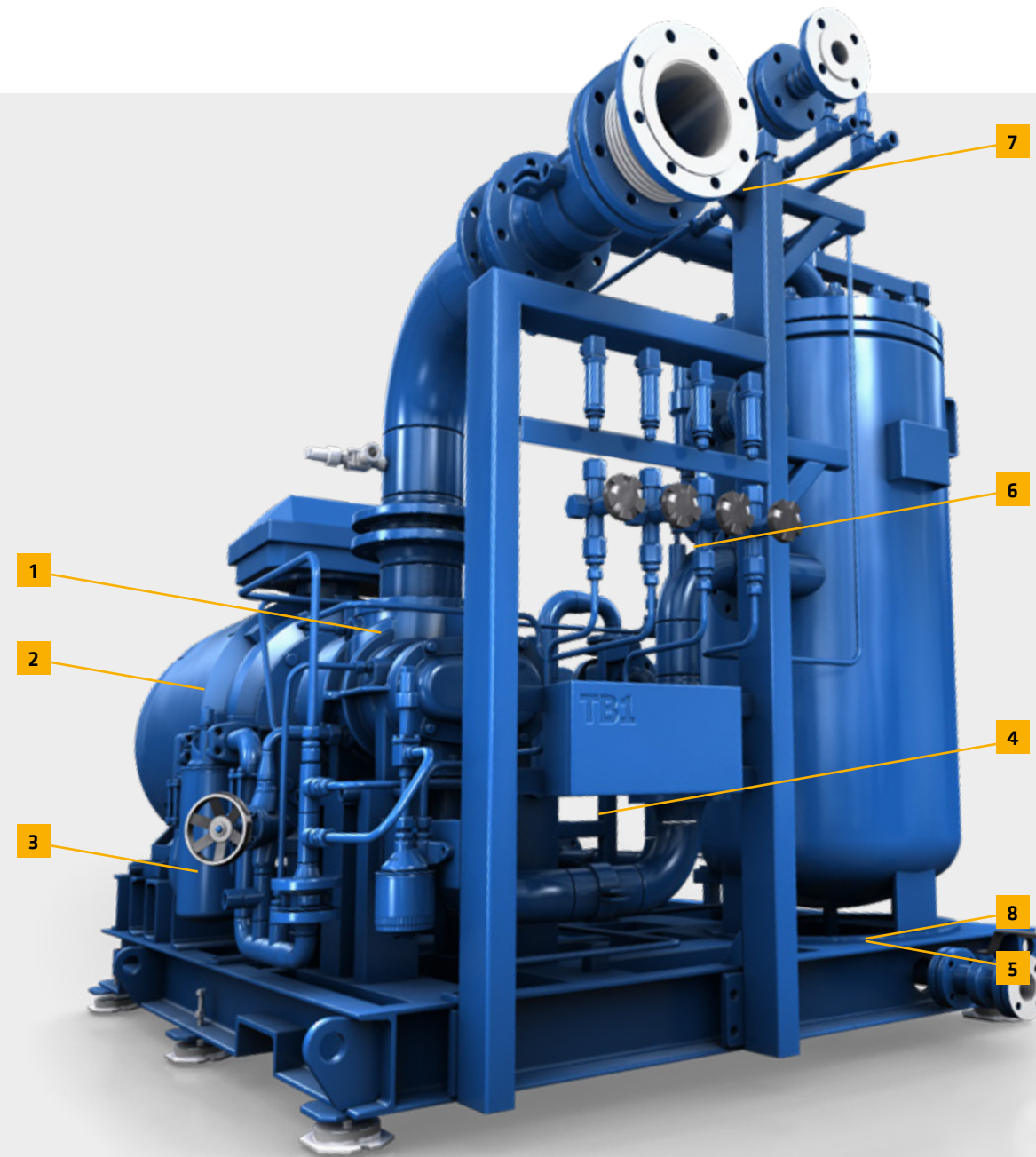


## Further accessories and modifications

- Fine separator for residual oil content < 1 ppm
- Gas cooler for cooling the gas temperature downstream of sealing
- Cooler for heat recovery
- Pre-filter to protect the compressors from larger particles or impurities
- Acoustic hoods or container version

## Exemplary scope of supply of a VMX package

- 1 VMX compressor stage**
  - Nodular iron (GGG 40.3 / EN-GJS-400)
  - Mechanical seal, oil-lubricated
  - Anti-friction bearing
- 2 Drive motor of the compressor stage**
  - Control- and power module incl. FI (optional)
- 3 Innovative oil system**
  - Incl. stationary oil reservoir and separator for Residual oil content <1 ppm (aerosol)
  - Pressure transmitter, shut-off valves and temperature measurement
  - Oil heating for optimum oil temperature at Compressor start
- 4 Oil cooling**
  - Designed as a plate heat exchanger
  - Compact and space-saving design of the Skid with modular adaptability



- 5 Base frame**
  - Easily upgradeable on any existing plant
  - Low annual costs, optimised maintenance result
- 6 Package internal instrumentation**
  - Signal routing to the terminal box
  - Control- and power cabinet (optional)
- 7 Compensators (optional)**
  - Vibration-free transfer (suction and discharge side, safety valve, water side, heat recovery)
- 8 Intelligent package design**
  - Enables standardised pipe routing in the modular system
  - PN 16 design, DIN flanges
  - Oil filter and oil pump for pre-lubrication of the mechanical seal before compressor start-up
  - Oil temperature controller



# AERZEN control technology

## The new transparency in your process

With the new generation AERtronic, AERZEN is further pushing digitalisation in the compression of process gases. The newly designed, intelligent package control system is more than just a digital control instrument. With new possibilities and functionalities, the AERtronic now provides more transparency, safety and efficiency throughout your entire process. Now also for the standardised VMX series compressors.

### AERtronic

If you are informed about the current and relevant compressor parameters at all times, you can react to possible malfunctions in the process at an early stage. The precondition for this: Maximum transparency about the compressor status - at any time. These and other objectives provided the impetus to revise the proven AERZEN package control system AERtronic from the ground up. Now the new AERtronic is also ready for the standardised VMX process gas compressors.



#### AERtronic basic equipment

- Intuitive navigation via touchscreen and 7" colour graphic TFT display
- Control according to various setpoint specifications
- Control and monitoring of electrical auxiliary drives
- Monitoring of process values
- Output or recording of the incidents
- Continuous acquisition of operating and service hours
- Protection class IP65 for display and control cabinet
- Extensive language selection

#### All common interfaces

- Modbus TCP (ethernet)
- Communication via MODBUS RTU
- Modbus TCP (ethernet)
- PROFIBUS DP
- PROFINET®

#### Extension options

- Certified according to UL
- Visualised vibrational monitoring with observance of limit values
- WebView - possibility for customer-side, web-based remote monitoring

### The new AERtronic - the digital future begins here

With the new edition of the AERtronic control system AERZEN paves the way to the dimension Industry 4.0. The newly developed model range offers you everything you need for this. A user-friendly, clear and transparent tool for analysing and processing all relevant process parameters. In the smart control system, all measured values converge and are systematically evaluated.

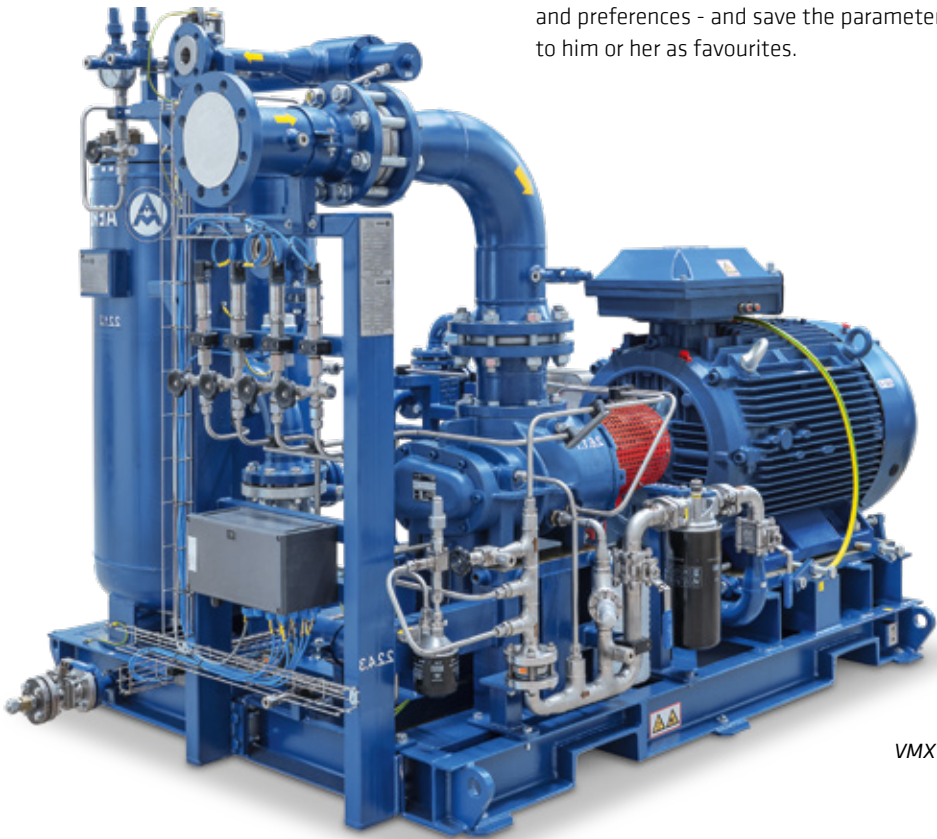
An important advantage: With the new machine control, every data point and also every piece of information can be easily transported to higher-level process control systems via almost all common and standardised interfaces of the industry standard. The system provides information on all important operating data, reports operating events at an early stage and ensures the complete documentation of all information. As a plant operator or production manager, this gives you a clear view of the machine's availability, efficiency and productivity. In this way, weak points in the process can be reliably identified and targeted corrective measures can be quickly initiated.

### Functional diversity and range of applications

The functional scope of the intelligent control system ranges from demand-oriented control of the compressor packages to optimisation of maintenance operations. The integrated maintenance book facilitates the planning of maintenance operations and thus increases their efficiency. The smart machine control also sets new market standards in terms of application range. AERtronic is suitable for both indoor and outdoor use. Designed according to protection class IP65, it defies all weather conditions and can even be used in outdoor areas down to -40 °C.

### Usability - well thought out for working practice

All data and information is displayed on a state-of-the-art 7 inch resistive touch display. User-friendly design and well thought-out for practical everyday work. For example, the robust screen technology also allows operation with work gloves. Another plus in usability: The new AERtronic from AERZEN can also adapt to the usage behaviour of its users. This includes the selection of different font sizes as well as the backlighting, which adapts to different lighting conditions in a way that is easy on the eyes. However, what is important above all is this: Each individual employee can create his or her own home screen - according to his or her working methods and preferences - and save the parameters that are important to him or her as favourites.



VMX 110 Biogas compressor



# Everything – expect ordinary

## The service world of **AERZEN**

The long service life of AERZEN machines is legendary. So why is service an issue at all? Because it's about more than availability and OEM original parts. The services from AERZEN secure investments, productivity and a decisive competitive edge. And this worldwide.



### AERZEN on-site service

Our service teams work where our machines are. All over the world. Onshore or offshore. Often under extreme conditions. How do we achieve this? With short distances. AERZEN has a dense network of service centres and decentralised parts warehouses around the globe. More than 200 excellently trained service technicians can come to your aid from there. Any time and anywhere you need us

### For rental service and other services

AERZEN's service world has a lot on offer. Tailor-made service kits, for example. Replacement stages, machine diagnostics, sound optimisations. One of our most important services is AERZEN Rental Division, which provides a large fleet of rental machines. Blowers, turbo machines and compressors - made by AERZEN. In a wide range of performance classes. For all common pressure ranges. Can be used immediately and delivered turnkey on request. What does that mean for you? You are also well prepared for unexpectedly upcoming needs [www.aerzenrental.com](http://www.aerzenrental.com)



### Contact worldwide

2,500 employees work for AERZEN. On every continent. With six sales offices in Germany alone, we're there for you. And with 50 subsidiaries in over 100 countries around the world. Hence we're never far away – should you ever need us. Give us a call: [+49 5154 81 0](tel:+495154810)

### Service-Infoline

Our German Service Centre is available for customers and operators. We are happy to help you. We look forward to your call: [+49 700 49318551](tel:+4970049318551)

### Customer Net

Where you can learn more about the company and the leading compressor technologies from Aerzen? It's simple: In our Customer Net on our website, where we have stored everything that is worth knowing for you: [www.aerzen.com](http://www.aerzen.com)



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## **AERZEN** Compression is the key to success

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

AERZEN is among the undisputed market leaders in many areas of application. At our 50 subsidiaries around the world, more than 2,500 experienced employees are working hard to shape the future of compressor technology. Their technological expertise, our international network of experts, and the constant feedback we get from our customers provide the basis for our success. AERZEN products and services set the standard in terms of reliability, value and efficiency. Challenge us.



### **LET'S TALK**

**Find your local contact**

[www.aerzen.com/worldwide](http://www.aerzen.com/worldwide)

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