AERZEN CONTROL TECHNOLOGY.

CONVENIENT, EFFICIENT AND SAFE CONTROL AND REGULATION.

AERZEN

SAVINGS POTENTIAL THROUGH DIGITAL CONTROL TECHNOLOGY.
ON THE WAY TO INDUSTRY 4.0.

Compressed air generation accounts for around seven percent of industrial power consumption. AERZEN has recognised this considerable savings potential early and paves with digital control technology the way to the efficient, demand-oriented compressed air generation 4.0.

Your Customer benefits

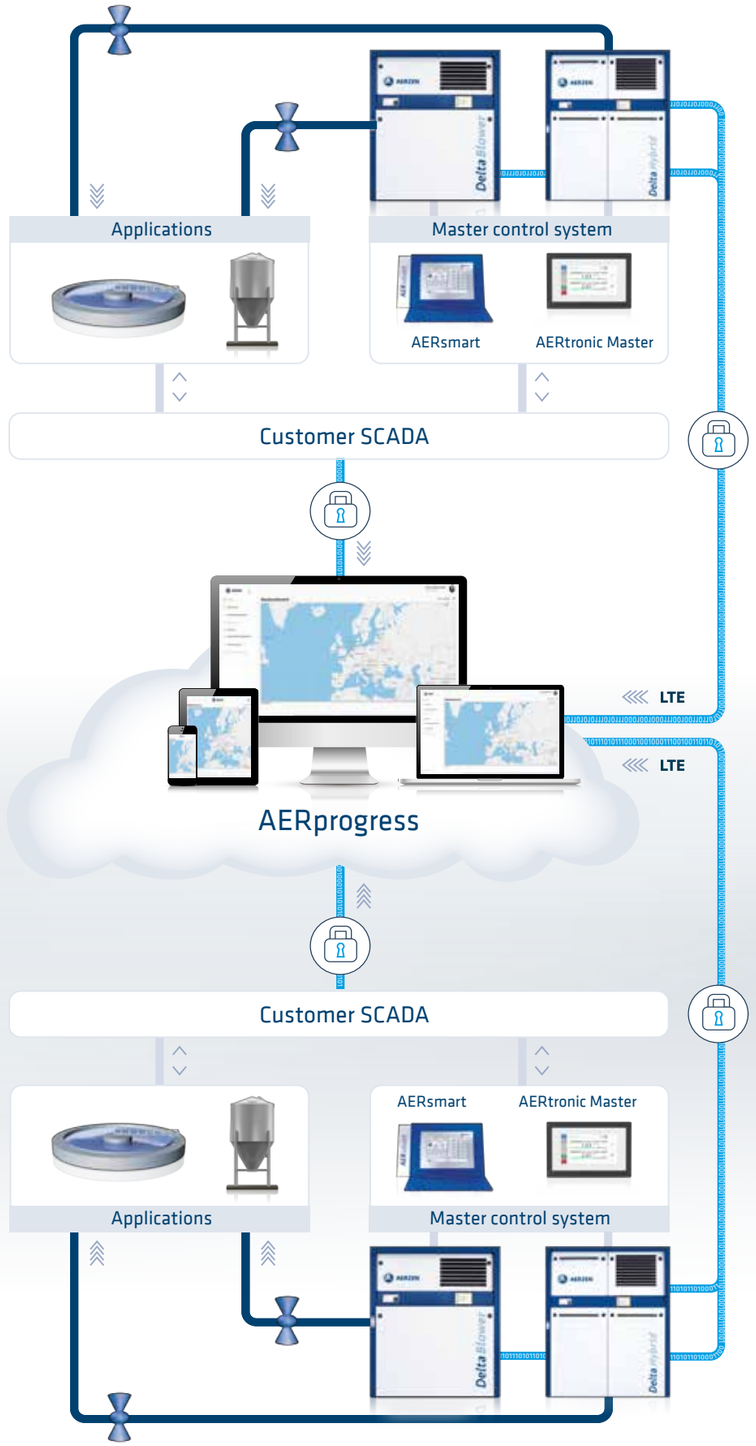
- Comprehensive transparency on machine condition and operating data
- Energy-efficient operation through optimal control of the process parameters
- Reliable system operation through integration of special sensors and actuators
- Industry 4.0 compatible

Reduce energy costs and conserve resources
The generation of compressed air for use in industry or in wastewater treatment is energy-intensive. The aeration of wastewater treatment plants in particular is the focus of efforts to achieve energy-efficient compressed air production: The air supply in the activation stage of wastewater treatment plants alone often accounts for more than 70 percent of energy costs in this area.

Manufacturers such as AERZEN have been able to significantly improve the efficiency of their positive displacement blowers, rotary lobe compressors, screw compressors and turbo blowers in recent years. Nevertheless, the master control technology still offers great potential for process optimisationand energy savings. Operators of wastewater treatment plants can use modern measuring technology to ensure greater transparency in their processes and adapt compressed air production individually to the requirement profile. At the same time, the integration of modern sensor technology into a master control and regulation system enables the continuous optimisation of operating and maintenance processes. The trend in process air supply is towards Industry 4.0.

.

Visit our website and learn more about the advantages that digital control technology has in store for you.
www.aerzendigital.com



Process air Data transfer LTE data

MORE TRANSPARENCY.
MORE SAFETY.
MORE OPTIONS.

AERtronic is the intelligent assembly control system from AERZEN. Designed to give you more. More transparency about your plant's status. More safety, to drive to the optimum operating point at all times. More possibilities to perform targeted analyses. Or to integrate further components - for example power cabinets.

	AERtronic	AERtronic Master	AERsmart	AERprogress
Local machine control	✓			
Higher-level integrated control system for load distribution		✓	✓	
Intelligent control of the machine network to maximise efficiency			✓	
Digital Services with Aerzen Digital Platform Connection (Cloud)				✓
Machine Park Management worldwide live monitoring				✓
Condition Monitoring Avoid machine failures, optimise maintenance times				✓
Energy Management Cross-plant consumption optimisation				✓

AERtronic

The intelligent machine control from AERZEN - Basis for all standard packages

AERtronic sets benchmarks, because when it comes to comfort and functionality, the intelligent and uniform assembly control from AERZEN cannot be surpassed. Developed for the Delta Blower, Delta Hybrid and Delta Screw ranges, AERtronic takes control of the efficient regulation and monitoring of your machines. Components such as power cabinets from third-party OEMs can be integrated without any problem. With its well thought-out range of functions, AERtronic offers you a wide spectrum of options for controlling, securing and maintaining your compressed air system.

Transparency. For sustainably longer operating times.
AERtronic gives you more. The system displays operational data, runs the working hour meter, reports operational events in a timely manner, and archives the information. In this way you can see how the assembly is integrated within the process at any time. You can therefore take highly targeted corrective measures when required. And this also has clear advantages in terms of maintenance, for example to make the planning of service calls more efficient.

AERtronic basic equipment
- Intuitive navigation via touchscreen and 7" colour graphic TFT display
- Monitoring of process values
- Output or recording of the incidents
- Continuous acquisition of operating and service hours
- Protection class IP65 for display
- Extensive language selection

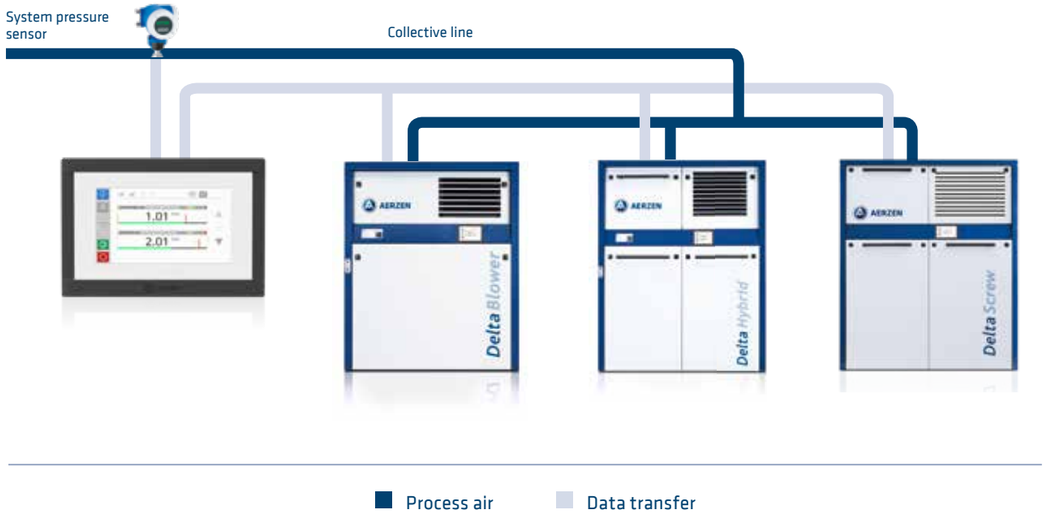
All common interfaces
- Communication via MODBUS RTU (standard)
- MODBUS Gateway between RTU and MODBUS TCP (Ethernet)
- PROFIBUS DP
- PROFINET©
- EtherNet/IP

Expansion options
- UL certified
- Monitoring of electrical auxiliary drives
- Automatic control according to system pressure for more energy-efficient operation
- Fault notification via text message
- Control of acoustic hood heating and electrical fun
- Visualised vibrational monitoring with observance of limit values
- Modifiable for special voltages
- WebView – module for web-based remote monitoring

AERtronic Master

Thanks to the AERtronic Master, it is possible to improve the overall efficiency of the plant, and to make the utilisation of the individual machines more homogeneous. In addition, the AERtronic Master offers the option of graphically displaying the operating status of the machines and sending the data to the customer's control room in compressed form. The connection is made via the RS485 Modbus: Alternatively, this can also be done via an expansion module using Profibus.

- Innovative control system for speed-regulated and unregulated compressors and blowers
- Fast and uncomplicated commissioning
- Consumption-dependent activation/deactivation of compressors/energy savings of up to 30%
- Additional cost savings thanks to optimised compressor running times and optimum adjustment of maintenance intervals
- 7" colour display with touch function
- The display provides the most important information about the entire compressed air station at a glance
- Operating states of the connected compressors
- Graphical representation of the network pressure as a curve over time
- Automatic control system for up to 12 machines simultaneously



AERZEN CONTROL TECHNOLOGY.
ALWAYS AT THE OPTIMUM OPERATING POINT.

With the new edition of the AERtronic control AERZEN pushes the digitisation in the process air production further. The intelligent assembly control system ensures greater transparency, safety and efficiency. Users can individually add further components to the machine control system.

The basic prerequisite for the efficient operation of compressed air processes is maximum transparency of the system status.Those who are informed at all times about the current demand situation, the relevant process parameters and the condition of the plant components can use this knowledge to optimise the process. Exactly this possibility has been realised by AERZEN with the completely newly developed and state of the art AERtronic.

The new AERtronic - the way into the digital future.
With the new edition of the AERtronic control system AERZEN paves the way to the digital future. The newly developed model series replaces the analogue circular instrumentation and offers the user a user-friendly, clear and transparent way to analyse and process relevant process parameters. In the AERtronic control system, all measured values converge and are systematically evaluated. In this way it is always possible to operate the plant at the optimum point and to achieve maximum efficiency with maximum service life. Thanks to the machine control system, the plant operator can achieve full protection and thus align his processes for maximum effectiveness. The integrated maintenance book also makes it easier to plan maintenance and thus increases maintenance efficiency.

However, the new generation of AERtronic does not only offer advantages for the operator. In the same way, almost all common and standardised interfaces of the industry standard allow any data point and any information to be easily transported to higher-level process control systems. This gives plant operators and production managers a clear view of the availability, efficiency and productivity of the machine - an insight into Industry 4.0.

The functional scope of the intelligent control system ranges from demand-oriented control to securing compressed air processes and optimising maintenance operations. The system provides information on all relevant operating data, reports operating events at an early stage and ensures the complete documentation of all information. In this way, weak points in the process can be reliably identified and targeted corrective measures can be initiated. In terms of user-friendliness, the new AERtronic has set a new market standard. The customers can view all data and information on a state-of-the-art resistive 7 inch touch display in a user- friendly design.

In addition, the screen technology also allows operation with work gloves.For better usability, AERZEN as a blower manufacturer has for the first time included the customers© usage behaviour with regard to blower control. This means that the user can now individually create the home screen and save his most important parameters as a favourite. In addition, the new AERtronic offers font size adjustment in several gradations as well as backlighting that can be adjusted to the lighting conditions and is therefore easy on the eyes.

AERtronic also offers new market standards in terms of application areas. It can be used both indoors and outdoors. By means of IP65 it defies all weather conditions and can be used in outdoor areas down to -20°C. Optional protection is provided by a protective hood, which also significantly enhances durability.

Technical data at a glance
- Voltages: 230V - 460V 50/60Hz
- 7" resistive touch with 800 x 480 pixels
- Protection class IP65 for display
- Linux operating system
- Operation -20°C to +55°C
- Common certificates such as UL, CSA; EAC and many more
- Micro SD slot
- Modbus TCP, Modbus RTU, ProfiNet®, ProfiBus®,EtherNet/IP®

AERtronic – the performance spectrum:

- Modern, adaptable control of the machine,of the accessories and the process
- Comprehensive insight into all operating parameters, maintenance information and events
- Enables easy integration of the AERZEN machines into the customer control system thanks to vailability of all common interfaces
- Possibility of holistic process observation and analysis
- Safeguarding the entire plant and avoidance of standstills
- Intuitive operation of the control system
- Large 7" touch display
- Use of digital services (AERprogress) and the AERZEN Cloud

Basic, Advanced and Premium
The differences at a glance.
The development of the new AERtronic series focused on the customer requirements of the various industries. Therefore AERZEN offers the communication-capable control system in three different versions: Basic, Advanced and Premium.

new table

		Basic	Advanced	Premium
Digital Display instrument	7" full touchscreen display	✓	✓	✓
	Digital display of all measured parameters	✓	✓	✓
	Display of warnings, faults and maintenances	✓	✓	✓
	Design for indoor and outdoor installation up to IP65 and ambient temperatures in operation from -20°C to +55°C	✓	✓	✓
	Machine control by start signal	✓	✓	✓
	Extensive language selection	✓	✓	✓
	Functional extensions via activation codes	✓	✓	✓
	Emergency shutdown in case of machine malfunctions	✓	✓	✓
	Process data storage on SD card	✓	✓	✓
	Process control connection via Modbus RTU (RS485)	**Option**	**Option**	✓
Active plant and process control	Process control connection via Modbus TCP (RJ45),	**x**	✓	✓
	Visualisation of the measurement data via trend graphs	**x**	✓	✓
	On-site on/off switching via touch	**x**	✓	✓
	Integration of special sensors and actuators	**x**	✓	✓
	Function update via SD card	**x**	✓	✓
	Remote control of the machine via bus and digital communication	**x**	✓	✓
	Process control connection via ProfiNet® or ProfiBus®	**x**	**Option**	**Option**
	Process control connection via EtherNet/IP	**x**	**Option**	**Option**
	Process control according to set pressure and oxygen content in the customer system	**x**	**Option**	**Option**
Remote monitoring and optimisation in the cloud	Connection to Aerzen Digital Platform via 4G/LTE modem	**x**	**x**	✓
	AERprogress Machine Park Management Live monitoring with remote access from anywhere	**x**	**x**	✓
	AERprogress Improvement System: Increase of machines and plant efficiency	**x**	**x**	**Option**
	AERprogress Consumption Certification: Reports according to energy management standard ISO 50001:2018	**x**	**x**	**Option**
	AERprogress Availability Management: Optimising the Availability	**x**	**x**	**Option**
	AERprogress Usage-based Maintenance: Maximisation of maintenance intervals	**x**	**x**	**Option**

Basic

AERtronic Basic - digital display element.

The AERtronic Basic variant acts as a digital machine parameter display and fault indicator. In addition, the device uses sensors to identify critical conditions in the process and shuts down the machine, if necessary, to prevent damage.

Unlike its predecessor, an analogue display unit with circular instrumentation, the user can now read the relevant process parameters such as pressures and temperatures on a modern display and integrate them as standard in his process control system. In addition, the system is able to indicate maintenance and malfunctions by colour change and to provide information on this via Modbus RTU. This system is, therefore, suitable for unregulated machines, but where the operator is entitled to full process transparency and safety.

The display of the AERtronic Basic control system allows the user to clearly read the following parameters, among others:

- Intake pressure
- Discharge pressure
- Oil pressure
- Discharge temperature
- Belt monitoring via discharge pressure
- Operating hours
- Maintenance messages
- Service history

Advanced

AERtronic Advanced - active control of processes.

The AERtronic Advanced control unit extends the range of functions of the Basic variant by the possibility of actively controlling processes. Both special sensors and special actuators can be integrated into this device. It is even possible to operate this machine via remote control (bus and digital communication).

Not only the remote control enables incredibly high potentials here. The optional frequency converter control creates a symbiosis of control unit and controlled system. This allows the plant operator to control the machines to the point without running the risk of overproduction - and can thus achieve energy-efficient operation. Furthermore, the customers can set and parameterise the PID controller 1 according to the process specifications, depending on the process and application. The connection of frequency converters is open-brand and independent.

Thus the customers can use their own components or AERZENstandard frequency converters. More flexibility is not possible. In addition, the plant operator has the possibility to transmit the recorded parameters via Modbus TCP, ProfiNet® or ProfiBus® to his superordinate systems such as Supervisory Control And Data Acquisition (SCADA).

This function makes it possible to make processes in the plant even more transparent and to identify potential for improvement at an early stage. This functional diversity is particularly advantageous in the case of the Delta Hybrid rotary lobe compressor and the Delta Screw screw compressor and is therefore provided as standard in the latter. If you are looking for an „Industry 4.0 ready" solution for your processes, you will find an advanced anduser-friendly machine control in the AERtronic Advanced.

Premium

AERtronic Premium - additional interfaces and cloud compatibility.

In the premium segment the user can integrate the intelligent AERtronic control into the Aerzen Digital Platform. There, the plant operator and user can then access a wide range of digital services in order to increase the efficiency of his machines as well as the availability and productivity sustainably and analytically with the help of artificial intelligence.

Through Machine Park Management within the platform the customer also gains a view of his entire AERZEN machine park and can evaluate maintenance and malfunctions as well as process changes holistically and not only related to one machine. This is the digital transformation of your blower technology!

Remote monitoring via WebView.

The transmission, analysis, visualisation and monitoring of data is of particular importance in the higher-level control and optimisation of compressed air processes. Therefore AERZEN has created with the WebView concept a central control instrument, which extends the functional range of the AERtronic control decisively.

The module gives the user access to the operating and service data of his individual machine from anywhere in the world. The integration of WebView offers decisive advantages for the user:

- High transparency of current and historical plant statuses
- Online access to operating data, operating hours, error messages and more
- Worldwide availability
- No additional software required
- Higher process reliability and availability
- Simple and clear maintenance planning
- Unidirectional access via customary stationary or mobile terminal devices

AERtronic:
Full transparency and process reliability with optimum control of the machine technology

CONTROLLING YOUR BLOWER COMBINATION MORE INTELLIGENTLY. MAKE SIGNIFICANT EFFICIENCY GAINS.

AERZEN has with Blower, Hybrid and Turbo the best machine technologies for this task. AERsmart, a new higher-level control system, further increases their performance. AERsmart distributes the air volumes optimally to the technologies and their individual efficiencies. The result: stand-alone efficiency values close to the theoretical optimum. Additional savings of up to 15%. Integration of other makes is also possible.

Appropriate service of load changes.
The load operation in biological wastewater treatment plants is characterised by strong fluctuations. The innovative AERsmart machine control system is the intelligent module that distributes the required oxygen demand across the machinery in such a way that low, medium and heavy loads are processed as efficiently as the existing configuration permits. To this end, the performance ranges and efficiencies are factored into the algorithm used by the control system. In this way, the installed machine pool operates as close as possible to the theoretical maximum efficiency.

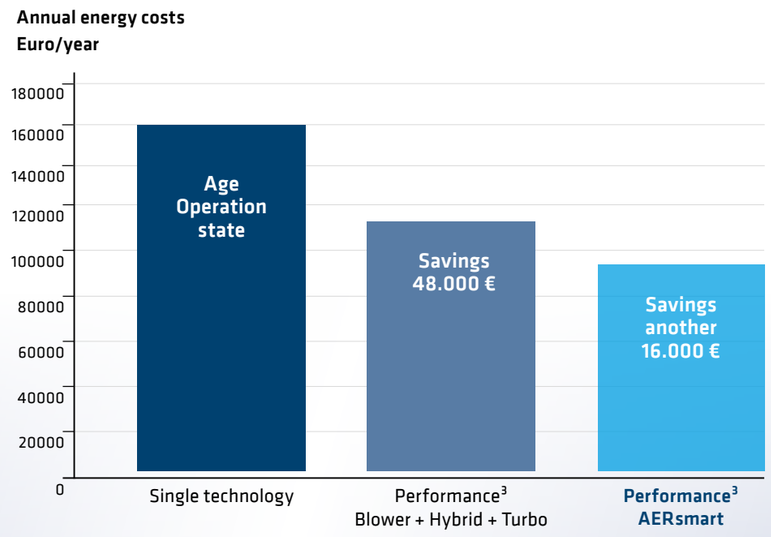
Even more performance for the "Dream Team" of water treatment.
AERsmart differs from classic so-called "group control systems", only controlling compressors of the same type. AERsmart also controls compressors of different technologies, primarily Performance^3 configurations made by AERZEN. Each machine technology and each machine size has different efficiencies within its characteristic diagram. AERsmart shares the required air volume so that the highest efficiencies of the individual machines or the entire configuration are utilised. In this way, the installed machine pool operates as close as possible to the theoretical maximum efficiency.

Autopilot for up to 12 machines.
AERsmart takes over the complete control and regulating management of a group of compressors and increases the enormous energy saving potential resulting from the combination operation of different machine types of the Performance^3 world. Even third-party products and installations with only one machine technology can be controlled via the overriding control system. In this way, AERsmart can control up to 12 machines to maximum efficiency - for efficiencies close to optimum as never before and a new level of efficiency in the aeration tank.

Strong trio made by AERZEN - Blower, Hybrid and Turbo

Savings potential in figures - shortest ROI times

Example of the German wastewater treatment plant with 326.000 population equivalents (PE)



CLEVERLY TUNE THE AIR SUPPLY. OPERATE LOAD PROFILES MORE EFFICIENTLY.

AERsmart consists of innovative soft and hardware components. The required oxygen volume is transferred to the AERZEN integrated control system as setpoint value e.g. as 4-20 mA signal or via bus connection. AERsmart selects the optimal machine combination, the most efficient load distribution and visualises the results in real time.

Equipment and features

Universal interface
- For linkage with the machinery and the process control system
- Connection via analogue signal and various bus protocols such as Modbus, Profibus, Profinet
- Internal data memory as well as USB- and SD-card slot
- Option: embedded webserver for data transfer via Internet, remote diagnosis

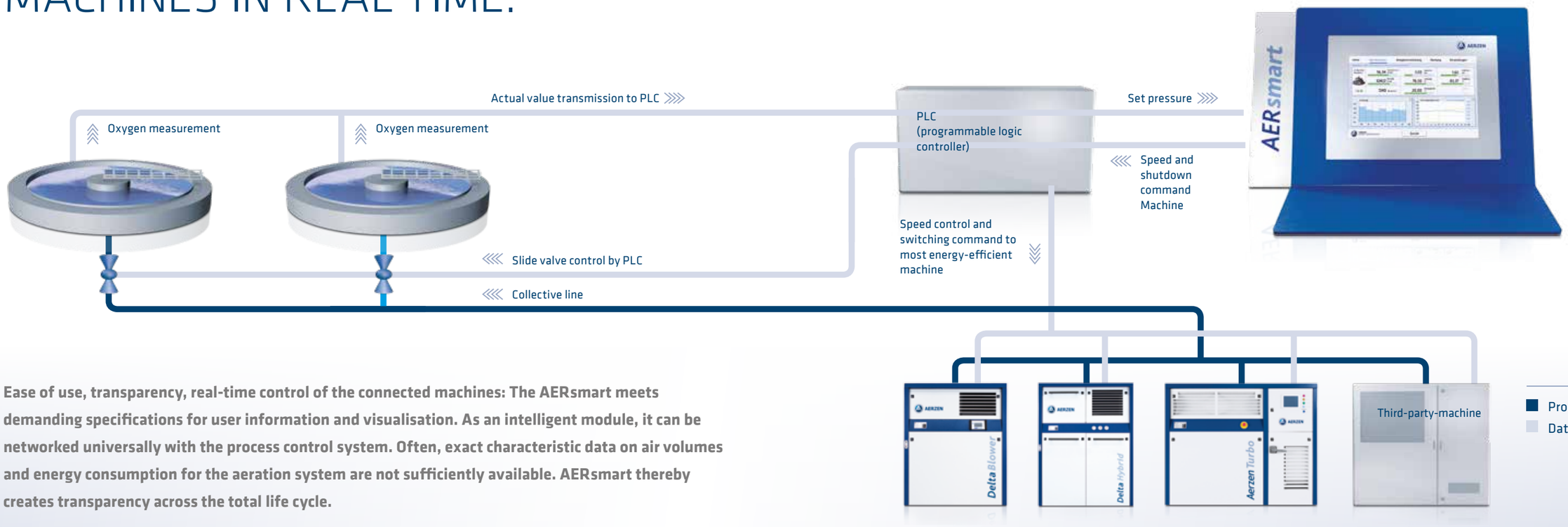
Flexible design
- Wall mounting or desk design
- Easy installation

Efficient control
- AERZEN algorithm and precise integration of the characteristic diagrams of the machines
- Highest efficiencies close to the optimum, efficiency increases of up to 15%
- Operate load profiles precisely as required and efficiently
- Technological diversity combines displacement machines as well as turbo machines
- Integration also of third-party products
- Interconnection control for up to 12 machines

Extensive visualisation and analysis
- Display and recording of the required air quantities, system pressures, temperatures, energy consumption and machine data
- Real-time representation, trend analysis and comparison of yearly values; reporting functionalities
- Service- and maintenance intervals of the integrated machines, proactive maintenance
- Extensive energy analyses and checks
- Trend-setting module for Water 4.0

User-friendly interface
- High-resolution 12“ Touch-Screen
- Intuitive menu navigation
- Everything at a glance: Total data and data of the individual machines
- Extensive language selection

SEE WHAT‘S WHAT.
CONTROL AND REGULATE MACHINES IN REAL TIME.

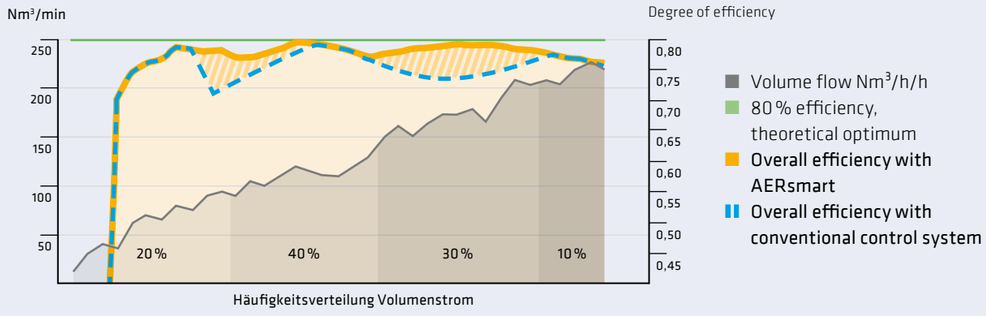


Ease of use, transparency, real-time control of the connected machines: The AERsmart meets demanding specifications for user information and visualisation. As an intelligent module, it can be networked universally with the process control system. Often, exact characteristic data on air volumes and energy consumption for the aeration system are not sufficiently available. AERsmart thereby creates transparency across the total life cycle.

Superior knowledge as a software solution.
The control of compressors in group operation, especially when using different machine types, requires basic machine knowledge and special control patterns. AERsmart‘s software contains detailed information about the connected machines and uses it to calculate the optimum load distribution in combined operation.

Intelligent zu- und abschalten.
Operational performance and the variety of unique characteristics of turbo and positive displacement machines influence the control range and efficiency curve, depending on the air volume and compression pressure of each type of equipment. AERsmart‘s software works with the advantages of each technology and avoids their weaknesses in the respective load range. The result: intelligent activation and deactivation, smart load distribution to the machines operating in combination.

AERsmart – for a new level of efficiency



Häufigkeitsverteilung Volumenstrom

AERprogress.
DIGITAL TRANSFORMATION OF BLOWER TECHNOLOGY.

Data-based services have the potential to support you in the operation of compressors to a completely new level. The automated collection, evaluation and analysis of data provides tailored information, reports and recommendations for action.

AERprogress

Condition Monitoring

Usage-based Maintenance

Maintenance (Condition-based)

Calculation of the time until the next maintenance

Maintenance and repair service on demand

ⓘ Recommended for customers with USAGE-BASED MAINTENANCE CONCEPT

Availability Management

Indication of the future availability and performance of the AERZEN machine

Signalling of unplanned failures

Ensuring maximum availability and providing well-founded predictions against unplanned outages

ⓘ Recommended for customers with a TIME-BASED MAINTENANCE CONCEPT

Energy Management

Improvement System

Consistent reduction of energy costs and CO2 emissions

Increase of single machine and compound efficiency

Output of recommendations for action to increase efficiency

Benchmarking of machines, networks and even locations with regard to efficiency

Consumption Certification

ISO 50001 Reporting per mouseclick for verification requirements

Evaluation of energy consumption per period

Calculation of statistical mean values

In combination with Improvement System:
Listing of recommendations for action to save energy

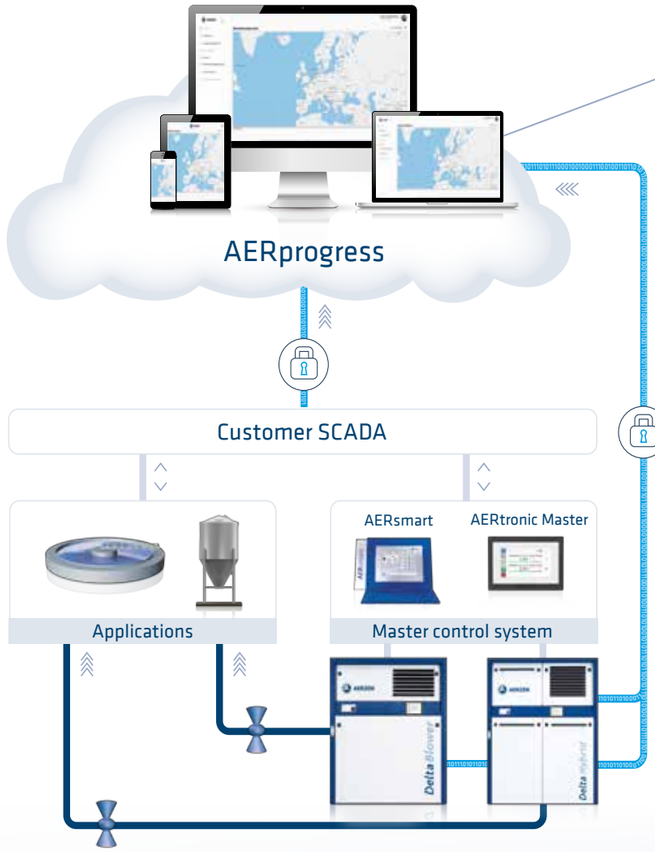
Basis
Machine Park Management

Live monitoring from anywhere
Remote service
Central plant management online
Real-time reports at the touch of a button
On demand service and maintenance protocols

Digitisation opens up new opportunities for companies in many industries to optimise processes. In blower and compressor technology, the trend is moving more and more towards automated recording, evaluation and analysis of operating data. This approach makes it possible to identify potential for improvement and to optimise the operation of compressors in the long term.

The change to networked compressor and blower packages is worthwhile for operators in several respects. On the one hand, it is possible to meet the steadily increasing requirements for CO2 reduction in accordance with the Paris Climate Agreement by significantly reducing energy consumption. This is accompanied by a noticeable reduction in energy costs due to lower power consumption, while operators benefit from greater process safety, transparency and reliability. Thanks to automated production data acquisition, processes no longer represent a „black box“ but can be systematically analysed for their efficiency. With modern, data-supported service and maintenance concepts, operators of compressor and blower packages can reduce the number of incidents and carry out maintenance work appropriate to the situation.

The AERZEN Group is committed to digital transformation and with AERprogress now offers its customers customised digital services for compressors and blowers.



Visualisation of the worldwide machine park

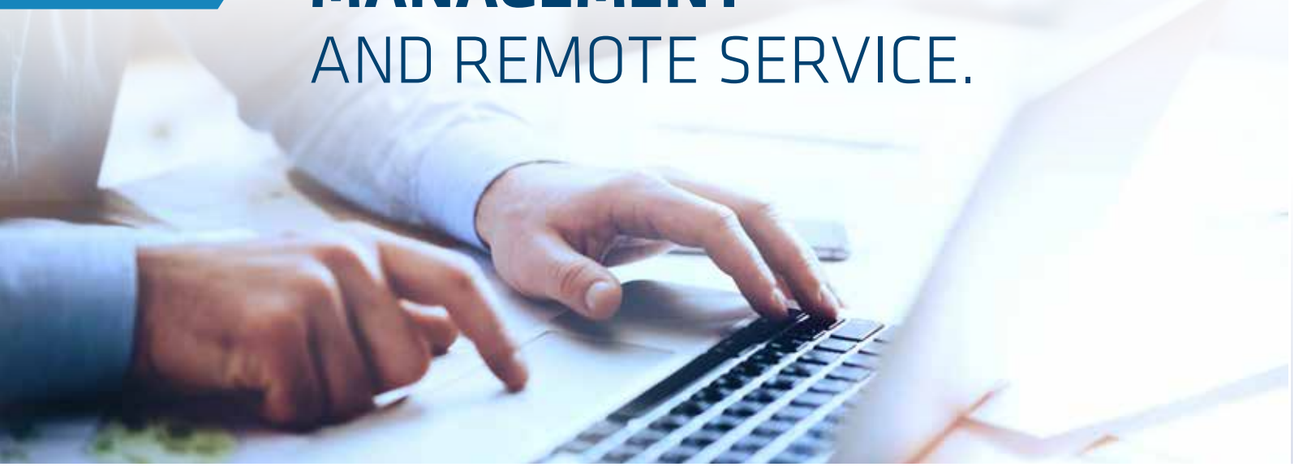
- Reduction of OnSite visits
- Suggestions for increasing efficiency
- Avoidance of machine failures

Plug & Play through LTE

- Safe data connection according to IEC 62443

Process air Data transfer LTE data

MACHINE PARK MANAGEMENT
AND REMOTE SERVICE.

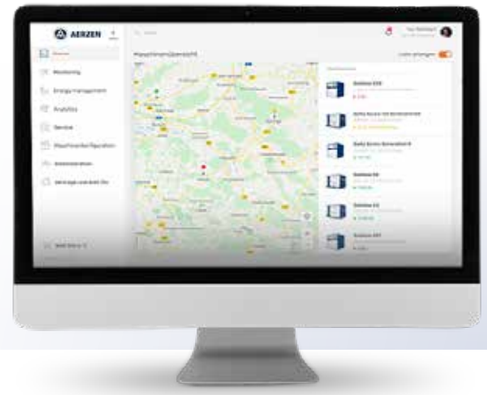


DEFINITIONS:

In information technology, Data ownership refers to the ownership of the data when handling company data. Data Ownership refers to the rights to and control of data, which are recorded by sensors in company processes, for example. The data owner is the only party with the right to use, exploit and distribute his data..

High-Level Data Security stands for a security standard for the transmission, storage and processing of data and meets numerous international requirements. The IT security standard ensures that the data is protected against access by unauthorised persons at all times. This is also guaranteed by certification of the hardware components and the security management according to IEC62443.

In information technology, artificial intelligence (AI) refers to the automation of intelligent behaviour. AI applications are able to independently record correlations between data through machine learning processes and to derive improvement measures from this data.



Transparency through data.
The Aerzen Digital Platform.
Mit Thanks to its Cloud-based platform, AERZEN is paving the way into the digital future of compressor technology. The concept places the operator of the facility at the centre of the overall process. The targeted recording of relevant process data in the facilities makes it possible to ensure maximum transparency in the processes and to sustainably optimise the cost structure in Machine life cycle cost management. In the course of digitalisation, customers benefit from cost savings through lower maintenance and personnel expenses, reduced energy costs, higher plant availability and a climate-friendly CO2 balance. This platform can be used with both stationary and mobile devices via web browser.

Machine Park Management and Remote Service for digital future.
As a basic package AERZEN offers the user-friendly Machine Park Management as well as remote service. Thus, the customers have the possibility to see transparently the operating status of all installed AERZEN machines including the control technology. On an interactive world map you can get an overview of all facilities and then select them specifically.

By displaying the machine status in the dashboard, it is possible to see at a glance which machines are in operation, which are in trouble and where maintenance is due. In this way, the customers are always informed about the current status of their machinery, can take quick action if action is required and can also instruct or have action taken remotely.

For further detailed information on the respective facility status, the relevant process parameters of all machines can be selected in the monitoring menu. The data is collected via the AERtronic assembly control system, which is connected to the online system via 4G/LTE mobile radio. Thanks to high-level data security, it is always guaranteed during transmission that the data is securely stored and processed in an EU Cloud and protected against unauthorised access. Particularly important from the user's point of view: Data ownership (ownership rights to the data) remains with the customer at all times. AERZEN always prepares the data anonymously, so that sensitive, customer-specific process data are protected.

The process data recorded by AERtronic, such as pressure and temperature conditions, are transmitted to the system in real time and visually processed as KPIs (Key Performance Indicators). Diagrams and trend displays allow you to draw conclusions about the performance, availability and utilisation of machines. At the same time, the user has the possibility to compare plants at different locations.

The system also provides for historical process and weather data to be added to the machine data record. In this way, it is possible to establish connections between external influences and internal process parameters and to draw conclusions about important dependencies..

Cost-efficient operation through central system monitoring.
Operators of blower and compressor packages benefit from maximum transparency thanks to the decentralized monitoring of their systems. Since all relevant data on machine performance can be viewed at any time and from anywhere, time-consuming, provisional inspections of individual sites are no longer necessary. The user is always aware of the condition of the systems and only needs to act if maintenance is actually due or if there is a system defect.

From the user's point of view, the possibility of creating individual reports according to requirements is also interesting: At the simple push of a button, the system operator receives a clear report with all relevant evaluations and recommendations for action regarding maintenance operations and ordering spare parts.

The advantages of Machine Park Management
- Time and cost savings through centralised facility management
- Significant reduction of on-site appointments
- Time and location independent access to all relevant machine data
- Cross-site comparison of key machine data
- Demand-oriented report generation at the push of a button
- On demand service and maintenance protocols

Customised add-ons for your individual projects.
The individual customer requirements for operation of blower and compressor packages are versatile. While for operators of wastewater treatment plants the focus is primarily on energy costs, other sectors such as chemical and process engineering, the process gas and refrigeration industry or compressed air technology are particularly interested in high process reliability.

For this reason, AERZEN has developed different add-ons, whose performance spectrum is optimally tailored to the different customer requirements. The add-ons are each assigned to the two categories Condition Monitoring and Energy Management.

The Digital Services can be booked individually depending on your project and are available as an extension of the Machine Park Management:

Condition Monitoring Section
- Usage-based maintenance: Minimisation of preventive maintenance costs and reduction of downtimes through maintenance
- Availability management: Maximisation of plant availability

Energy Management Section
- Improvement System: Maximising efficiency over the entire life cycle
- Consumption Certification: Energy reporting according to the international standard ISO 50001

CONDITION MONITORING.
PLANNING OF MAINTENANCE AND REPAIR.

From reaction to action through condition monitoring
Condition monitoring allows the plant operator to carry out maintenance and repair work depending on the plant condition. This usage-based strategy makes it possible to precisely determine the time of the next maintenance well in advance. Before a component reaches the end of its lifetime and causes a time-consuming and costly plant shut-down, messages are generated in the AERZEN Digital Platform at an early stage. The operator has sufficient time to plan service and maintenance times and to procure the necessary spare parts. Condition Monitoring makes it possible to optimise plant availability and noticeably reduce downtimes. A basic distinction is made between the two strategies of time-based maintenance (TBM) and use-oriented maintenance (UBM):

- **Time based maintenance (TBM)**
  With the time-based maintenance strategy, the operator carries out maintenance of the systems at fixed intervals. This ensures that components with many operating hours are replaced in good time before the end of their service life.
- **Usage based maintenance (UBM)**
  The usage-based maintenance strategy takes the actual system condition into account. This strategy makes it possible to fully utilise the service life of components and to reduce the number of service and maintenance operations to a minimum.

AERZEN offers the trendsetting add-on Usage-based Maintenance, based on modern AI (Artificial Intelligence) technology, for Machine Park Management.

Usage-based Maintenance - Intelligent strategy for costreducing maintenance and repair
The usage-based maintenance strategy aims to maximise the service life of plants by taking into account its actual condition. This concept pays off especially for plants that are not operated at the load limit. If blowers and compressors are operated at partial load for long periods, the “Mean Time Between Maintenance,” i.e. the average operating time between two maintenance operations, can be optimised. This makes it possible to sustainably reduce operating costs.

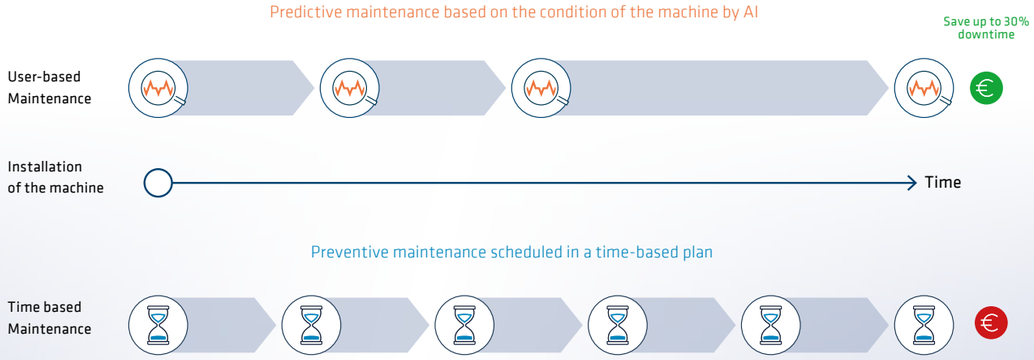
For heavily used machines that are regularly operated under full load, the maintenance interval is adjusted accordingly with regard to optimum availability. This ensures that components are replaced in good time before the onset of fatigue and avoids costly plant downtime.

With the Usage-based Maintenance Add-on, the user benefits from noticeably lower operating and maintenance costs. In particular, preventive maintenance operations can be reduced over the entire service life. At the same time, a prudent maintenance strategy allows existing personnel resources to be used optimally. In addition to the life cycle costs (LCC) of the plants, the additional costs caused by plant downtimes are also minimised.

With additional service and maintenance contracts from AERZEN you also secure on-demand delivery of spare parts and access to trained personnel. The close interconnection between the AERZEN Digital Platform and our worldwide After Sales network ensures minimum reaction times for upcoming maintenance works.

Digital services available on the digital platform of AERZEN

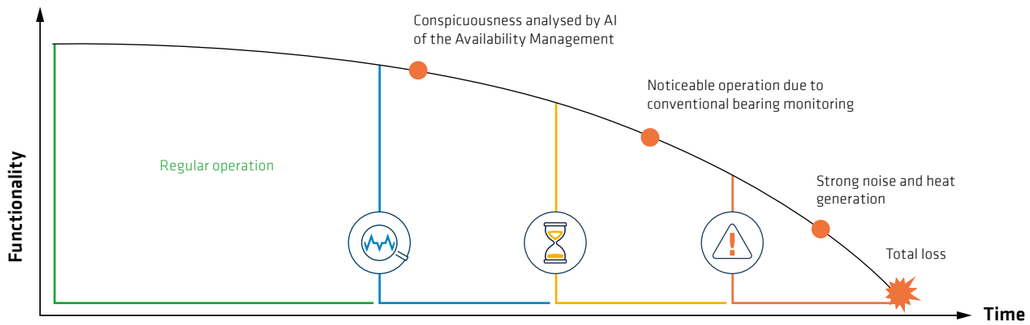
Comparison of time-based maintenance (preventive maintenance) and user-based maintenance (condition-based)



Availability Management - Reliable early warning system to avoid plant downtime
With the Availability Management Add-on AERZEN addresses in particular customers who cannot intervene unscheduled in the regular operation of their plants - for example in case of seasonal operation.

The add-on aims to maximise the availability of the plants by the targeted analysis of the machine and environmental data, to avoid unplanned outages and to reduce costs due to plant downtimes. This add-on is particularly recommended for operators who, due to their production processes, follow thetime-based maintenance concept in order to avoid unplanned downtimes.

The operator of the plant is informed in good time of impending breakdowns and thus has the opportunity to take precautionary measures such as the procurement of spare parts or the assignment of service technicians. The probabilitybased system allows for the daily forecast of downtimes and downtime durations, thus ensuring the ability to act at any time. This approach makes it possible to plan maintenance assignments according to the necessity and to achieve a significant reduction of unplanned downtimes. Another advantage: by using this system, the terms for production volume insurance policies can be significantly improved. Thanks to putting these early warning measures in place, the insurer may conclude that this improves risk management and may accordingly reward the insured with lower premiums.



Availability Management - Reliable early warning system to avoid plant downtime

ENERGY MANAGEMENT.
REDUCE ENERGY COSTS AND SAVE RESOURCES.

Recognise potentials and fulfill obligations to provide evidence
Under the category Energy Management AERZEN offers its customers add-ons to transparently view the energy consumption of all plants at any time, to reduce energy costs in the long run by targeted measures and to provide the proof obligations within the ISO 50001:2018 standard. The Energy Management consists of the two add-ons Improvement System and Consumption Certificationtion.

Improvement System - Transparently view, compare and optimise energy consumption
The Add-on Improvement System offers the user the possibility to view the energy consumption of all plants and machines at any time.

By displaying KPIs on production costs, CO2 emissions and efficiency in the machine network, it is possible to compare machines or even entire sites in terms of their energy efficiency. The data are displayed as actual states, and additional consumption is identified and determined.

In addition, the Improvement System evaluates the machine periphery in order to uncover further influences on energy consumption. The parameters recorded include, for examp:

- air filter cartridge
- intake temperature
- intake pressure
- differential pressure
- load profile
- load distribution
- downtimes
- compound efficiency

An example should illustrate the cost savings that can be achieved in practice: Two D36S type rotary lobe compressors operate in their original configuration with an average capacity of 43.7 kW each. With 5,000 operating hours per year and an electricity price of 0.18 euros per kilowatt hour, this results in energy costs totalling 78,660 euros per year.

Consumption Certification: ISO 50001:2018 reporting at the click of a mouse
With the Consumption Certification add-on, users have the option of creating standard-compliant reports from the recorded data on energy consumption with just one click. The reports meet the requirements of the international energy management standard ISO 50001:2018 and make it easier for you to meet the obligation to provide proof to shareholders and stakeholders. You can display statistical mean values and evaluate energy consumption per period as required.

If you book the Consumption Certification Add-on in addition to the Improvement System, you will also receive targeted recommendations for optimising energy efficiency. The system also indicates the expected return on investment (RoI) for the proposed measures.

Close interlocking with worldwide after-sales - Services.
The Digital Services are sensibly coordinated with the already existing AERZEN After Sales Services. This gives customers the opportunity to combine Digital Services with Service Level Agreements to access the full range of after-sales services. The scope of the service and maintenance contracts can be individually tailored to the customers© needs.

Das Improvement System gibt die folgenden Handlungsempfehlungen für den Betrieb der beiden Verdichter:

Measure	Energy saving	Cost savings per year
Temperature increase by 3 K	0,4 kW	720 €
Reduction of room ventilation losses	1,1 kW	1.980 €
Reduction of the pressure loss at the filter cartridge	2,1 kW	3.780 €
Rectify pressure loss at blocked aerator	2 kW	3.600 €
Optimisation of control by AERsmart Control System*	3,37 kW	6.066 €
Optimisation of the installed machine combination - Performance³*	ca. 1 kW	900 €
Total	**9,47 kW**	**17.046 € (-22 %)**

* Causes additional investments and depends on load curve and application

The measures shown in this example have succeeded in reducing the energy costs of the two rotary lobe compressors by a total of 9,470 euros per year. This corresponds to a saving of 22 percent. The recommendations for action take into account optional manufacturer-specific possibilities for optimisation, such as control optimisation using AERsmart or an alternative composition of machine technologies (AERZEN Performance³ concept). The comparison with the load curves of other machines also allows the user to identify further savings potential.

The Add-on Improvement System supports you in this:

- to reduce the Life Cycle Costs (LCC) in terms of energy costs
- to sustainably increase the cost efficiency of the machines
- avoid wasting energy and unnecessary CO2 emissions
- compare several machines with regard to their energy efficiency

AERZEN. Compression - the key to our success.

AERZEN was founded in 1864 as Aerzener Maschinenfabrik. In 1868, we built Europe's first positive displacement blower. The first turbo blowers followed in 1911, the first screw compressors in 1943, and in 2010 the world's first rotary lobe compressor package. Innovations "made by AERZEN" keep driving forward the development of compressor technology.
Today, AERZEN is among the world's longest established and most significant manufacturers of positive displacement blowers, rotary lobe compressors, screw compressors and turbo blowers. AERZEN is among the undisputed market leaders in many areas of application. At our 50 subsidiaries around the world, 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, stability of value and efficiency. Go ahead – challenge us!

FIND YOUR LOCAL CONTACT

www.aerzen.com/worldwide

Aerzener Maschinenfabrik GmbH
Reherweg 28 – 31855 Aerzen / Deutschland
Telefon: +49 5154 81 0 – Fax: +49 5154 81 9191
info@aerzen.com – www.aerzen.com

AERZEN
EXPECT PERFORMANCE

Control technology (S1-001-02)_EN_Headquarter
03|2022