BOGE AIR. THE AIR TO WORK.

BOGE
COMPRESSED AIR SYSTEMS

BOGE's energy efficient solutions

Green Efficiency

More than 100,000 users from trade and industry expect more when it comes to the supply of compressed air.

BOGE air is the air to work.

The 62,000 compressed air systems operating in Germany consume 14 billion kWh of electricity each year. This is equivalent to five percent of the electricity consumption of industry as a whole. Using this energy as efficiently as possible is an economic issue as well as an ecological necessity: with a reasonable amount of investment, users can save between 30 and 50 percent of their costs on energy for compressed air. The BOGE efficiency range benefits both the environment and your budget – our efficiency consultants will be pleased to advise you!

CONTENTS

WHY THE NEED FOR EFFICIENT COMPRESSED AIR? 4

OVERVIEW OF MEASURES 6

- REQUIREMENTS ANALYSIS AND LEAKAGE MEASUREMENT 8
- SYSTEM DESIGN 10
- SYSTEM RENEWAL 12
- INTELLIGENT CONTROLS 14
- HEAT RECOVERY 16

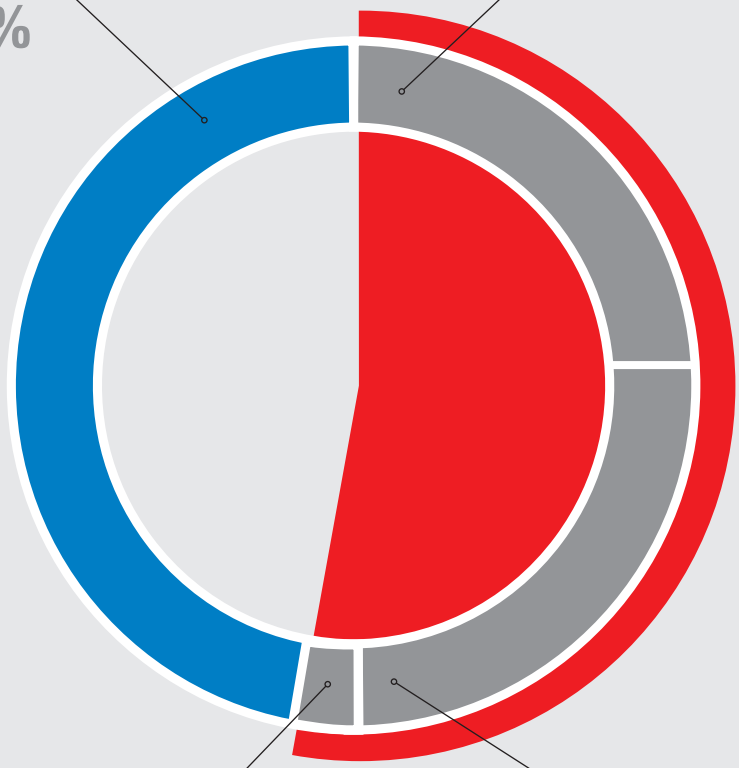
EFFICIENCY CALCULATION 18

Achieve more with less.

Why we need more efficiency in the production of compressed air.

THROWING MONEY OUT OF THE WINDOW. IS THIS HOW YOU MANAGE YOUR COMPRESSED AIR?

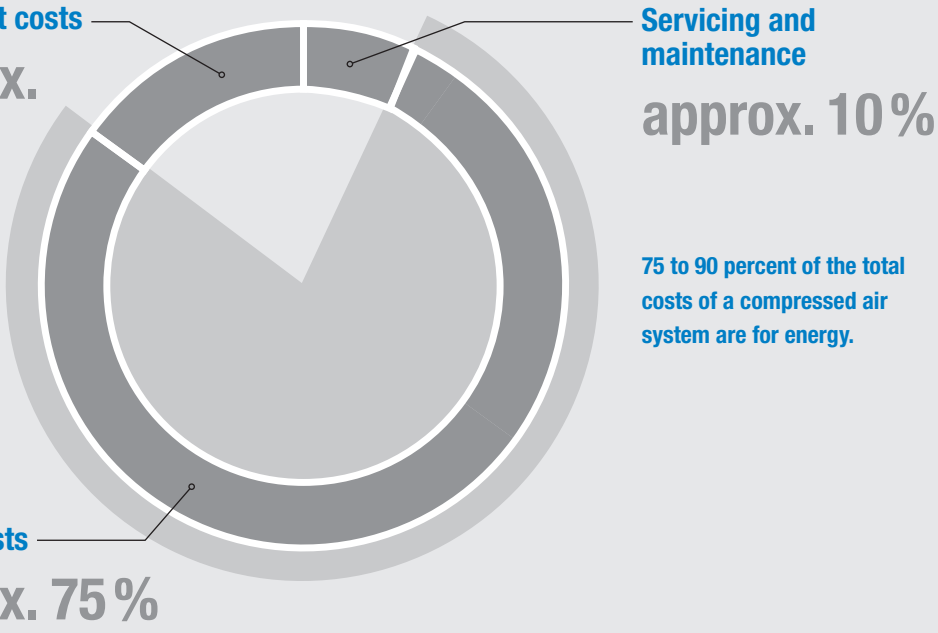
Although users know that energy is consumed in the generation of compressed air, very few of them seem to be particularly concerned about the energy efficiency of their compressed air stations. In typical industrial applications, as little as 45 percent of the total energy consumed in providing compressed air is used to meet the actual air demand. The rest is either money thrown out of the window – or can be converted into future savings, if you optimise your system!



Less can do more: Compressed air has become an indispensable commodity in industry and other areas. But it is still energy intensive and therefore also cost intensive. At the same time, many users of compressed air are unaware that, according to the experts, the total energy requirement of this sector could quite easily be reduced by 30 to 50 percent. This would result in environmental benefits as well as significant cost reductions. So what are we waiting for?

THE COST FACTORS FOR COMPRESSED AIR ARE ALMOST EXCLUSIVELY ENERGY RELATED.

When we talk about compressed air costs, the energy factor dominates all other aspects. Energy costs make up between 75 and 90 percent of the total costs accrued throughout the entire service life of a normal compressed air station used in industry – and the larger the system is and the longer the operating hours are, the higher this percentage will be. The costs for acquisition, servicing and maintenance are almost negligible in comparison.



75 to 90 percent of the total costs of a compressed air system are for energy.

THE ENVIRONMENTAL FACTOR FOR COMPRESSED AIR. EFFICIENCY IS RESPONSIBILITY IN ACTION.

In Germany alone, 62,000 operational compressed air stations consume a total of 14 billion kWh per year. This is equivalent to the energy produced by about 1.5 nuclear power plants. The fact that this figure could be reduced by up to 50 percent should provide a double incentive: to take responsibility for our economic and ecological efficiency.

Green Efficiency

Efficient compressed air saves energy, reduces CO_2 emissions and thus conserves the environment – efficiency is green!

Know what makes sense.

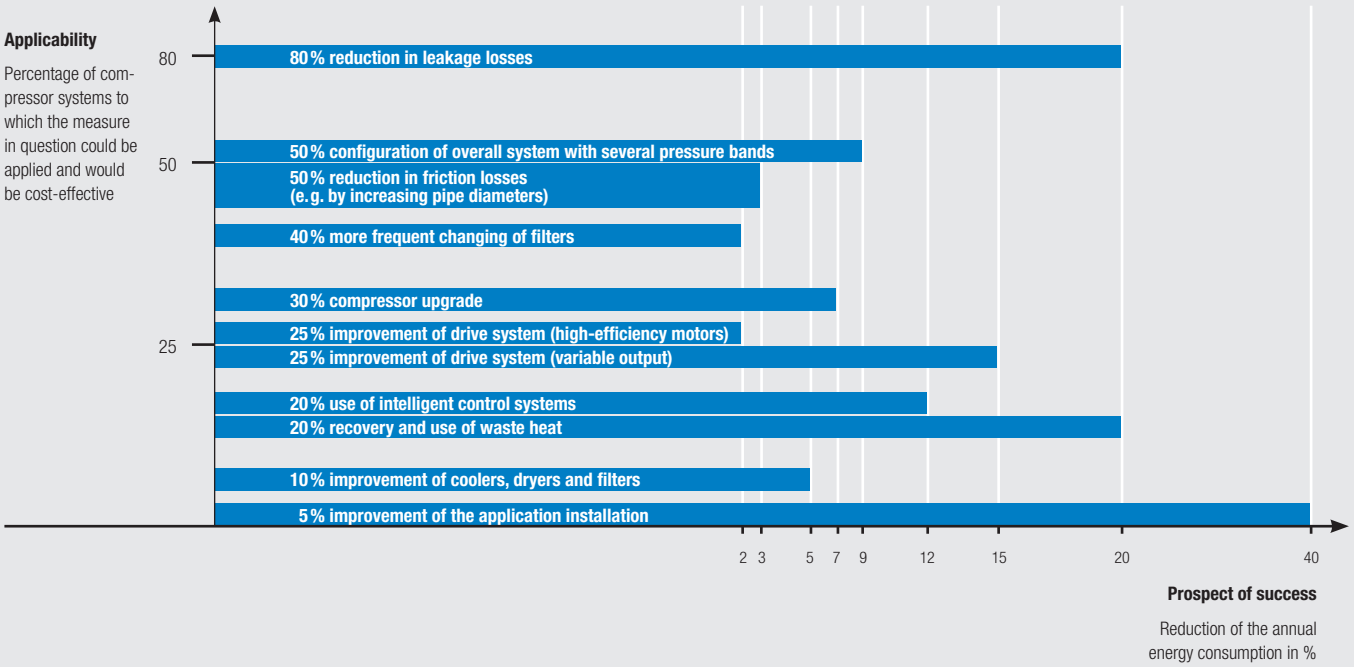
The applicability and chances of success of efficiency-enhancing measures.

MANY STARTING POINTS – GREAT PROSPECTS.

A Europe-wide study by Radgen/Blaustein1, which continues to point the way ahead in this field, provides a basis for evaluating efficiency-improving measures. It quantifies the applicability and chances of success of various energy-saving options. Though the study is no substitute for an in-depth analysis of each individual situation, it still demonstrates quite clearly, based on the many available approaches and excellent prospects, that all users of compressed air would do well to address the issue of efficiency improvement. BOGE's experience with actual projects also shows that between 30 and 50 percent of the energy used for compressed air systems can be saved and that most efficiency measures pay for themselves within less than two years.

[1] Radgen/Blaustein, Compressed Air Systems in the European Union. Energy, Emissions, Savings Potential and Policy Actions, 2001.

APPLICABILITY AND CHANCES OF SUCCESS:



Which measures bring which benefits?
A Europe-wide study demonstrates the applicability and chances of success of efficiency-enhancing measures.

Rational thinkers to the fore: **Empirically verified data is available regarding the applicability and chances of success of efficiency-enhancing measures. This data shows that a number of measures can be taken that are easy to implement in practice and that promise great success. Our experts will be glad to help you with your individual cost/benefit calculations. We can then implement the appropriate measures for you, if desired.**

INCREASING COMPRESSED AIR EFFICIENCY: THE TOP 5 MEASURES.

1. REQUIREMENTS ANALYSIS AND LEAKAGE MEASUREMENT

Most of the energy wasted in a compressed air station is used to produce compressed air that subsequently escapes via leaks or that is not really needed. To find out how a requirements analysis and the regular measurement of leakages can be used to optimise this situation, turn to **pages 8 and 9**.

2. SYSTEM DESIGN

Is your overall system designed to meet your actual requirements and are the components correctly optimised? If not, there are likely to be efficiency losses in many areas of your compressed air system. We will show you how to optimise your use of energy and resources through intelligent design of your functional process chain: see **pages 10 and 11**.

5. HEAT RECOVERY

During the compression process, a high percentage of the energy used is converted into heat. An efficient compressor system uses this heat for other applications. Up to 94 percent of the heat generated by the compressor can be recovered in this way and used in suitable areas within your operation. See **pages 16 and 17** for further details.

3. SYSTEM RENEWAL

The percentage of the energy used that a compressor converts into actual output also depends on its technological design. Modern machines are characterised by highly efficient motors and stages, modern fans, and heat recovery. You can find out more about this on **pages 12 and 13**.

4. INTELLIGENT CONTROLS

The relationship between full load operation times and idle times plays a very important role in the energy efficiency of a compressed air station. Intelligent controls select the most efficient compressor combination according to the actual demand, thus optimising idle times and pressure levels. They also ensure that the parameters of your system are transparent. See **pages 14 and 15** for further details.

Tracking down the efficiency killers.

Analyse and stop unnecessary energy usage.

THE EFFECT OF LEAKS.

The study carried out by Radgen/Blaustein (see pages 6 and 7) shows that the elimination of leaks results in potential savings of up to 20 percent. This on its own is a good reason to keep a continuous eye on leakage within your compressed air system. The following table shows how even the tiniest of leaks can have a dramatic effect on costs:

Size of leak		Leakage at 8 bar	Losses	
mm	Size	l/min	kW	€/year
1,0	◦	75	0.6	315,–
1,5	○	150	1.3	683,–
2,0	○	260	2.0	1051,–
3,0	◯	600	4.4	2312,–
4,0	◯	1100	8.8	4625,–
5,0	◯	1700	13.2	6938,–

QUANTITATIVE LEAKAGE MEASUREMENT.

Every compressed air system has leaks. But at what point does leakage control justify the associated expense? The BOGE service package **"Leak detection including quantitative leakage measurement using ultrasonic detectors"** provides you with specific indications as to which repairs are cost-effective or whether it would be better to consider overhauling the network.

Leaks occur not only in the main pipelines but in flanges, connections, couplings, maintenance units, and in the compressor itself. Using ultrasonic sensors, BOGE experts can not only determine the location of the leak, but also provide details of the amount of leakage. This analysis is essential in allowing you to reliably assess the benefit of leak control measures.

LEAKAGE MONITOR WITH THE BASE CONTROL OR FOCUS CONTROL SYSTEM.

The BOGE leakage monitor measures losses automatically and shows them in the display of your compressor control unit. Shortly before operation is due to shut down (for the weekend, for example, or at night), activate the leakage monitor via the control unit. Six hours later, the measurement process commences and the leakage monitor determines the full load operation times of the compressor. Since the compressed air consumption at this time is equal to zero, all of the measured full load operation times serve exclusively to replace leaked air. At the end of the six-hour measurement phase, the leakage losses, extrapolated to yearly losses, can be read out from the control unit display. This gives you a solid foundation on which to base your decision regarding further measures.

The quantitative leakage measurement determines not only the location of a leak but also the amount of leakage.

On-board or retrofitted: In new machines, the BOGE leakage monitor is already incorporated in the base control and focus control units as standard. For older machines, the function can be activated via a software update/upgrade.

Is your compressed air network or system working efficiently? Ideally, your compressed air station should produce only the amount of compressed air that is actually needed. Unfortunately, this is often not the case in practice, where compressors are disproportionately dimensioned relative to the actual air demand, or produce compressed air that cannot be used because it escapes via leaks. As long as you are unaware of this, of course, you will not be able to change it. BOGE's service and special tools help you to track down the efficiency killers.

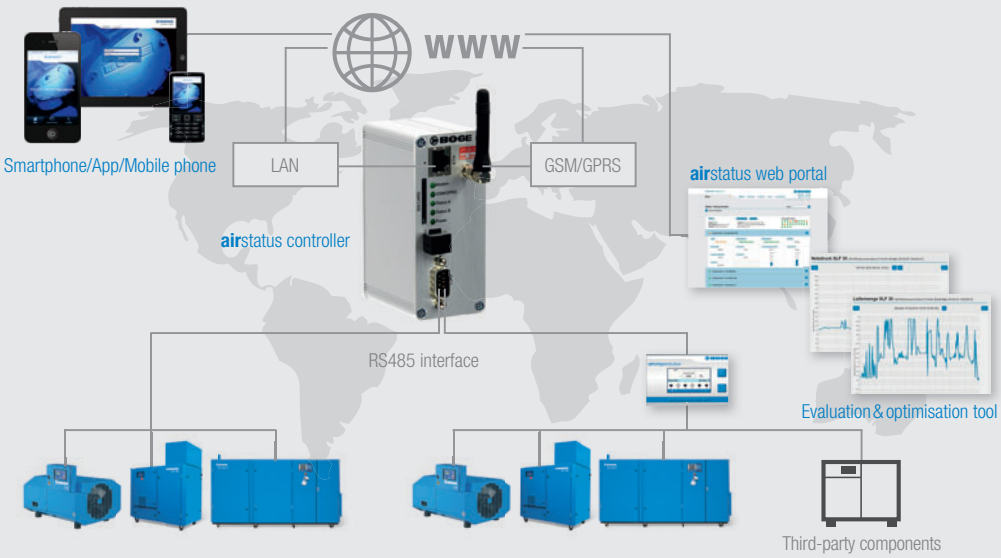
BOGE AIREPORT: ANALYSIS OF THE COMPRESSED AIR DEMAND AND OF THE ENERGY CONSUMPTION.

The **AIR**eport check-up system detects weak points during long term monitoring and helps to improve compressed air systems effectively. The data provided by the **AIR**eport system allows you to see at once whether the energy you are consuming is proportional to the actual output or to the actual demand. Compressed air losses resulting from leaks, pressure drops between the generator and the consumer, and disproportionate maximum pressure levels are also detected by the **AIR**eport system and can then be eliminated.

AIReport makes the efficiency of your system visible, thus helping to uncover potential savings in energy.

BOGE AIRSTATUS: PLANT MANAGEMENT MADE EASY.

With the BOGE **air**status system, you have a constant overview of the process values provided by the controls of your compressed air devices – including temperature, pressure, operating hours, idle hours and servicing status values. This cyclically measured data can be called up, graphically displayed, and evaluated at any time via your PC or smartphone, or using the BOGE app, to provide you with information regarding the potential optimisation of your compressed air supply. BOGE **air**status also lets you know, via text message, email, or voicemail, if faults occur or defined parameters are breached.



BOGE airstatus saves and presents you with the process values of your compressed air station, giving you information regarding potential areas of optimisation. You can receive, evaluate and graphically display this data using the BOGE app, for example, or using the airstatus web portal.

Systematic saving.

How to organise your overall system efficiently.

CRITICAL AREAS WITHIN THE SYSTEM.

DEMAND / PRESSURE

Many users operate their network at a higher pressure, just to be “on the safe side”. But for every bar of extra pressure, the energy required is increased by 6 percent. Reducing the compressor pressure to the actual value required and reducing pressure losses within the system (by stopping leaks, for example) are therefore important aspects in the planning and optimisation process.

LOAD TIMES / IDLE TIMES

Many compressed air stations operate with significantly oversized fixed speed compressors, resulting in unnecessary idle times. Unless the compressed air is required to be absolutely constant, it is better to use a variable-speed compressor as a peak-load machine. If several compressors are in use, then a master control system should be used to coordinate the load times and idle times of the various compressors.

PIPE NETWORK

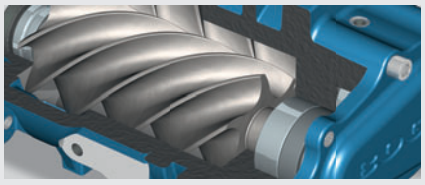
In many systems, the pipelines are too long, or the pipe diameters are far too small – this means that a higher, more cost-intensive pressure is required at the point of generation in order to provide the required pressure at the point of use.

AMBIENT CONDITIONS

Ideally, the compressor room should be kept cool: an increase of 20 degrees Celsius in the temperature of the intake air will lead to pressure losses and to a free air delivery loss of approximately 7 percent. It is also important to ensure that adequate ventilation of the compressor takes place and that the intake air is dry and clean.

COMPONENTS

Modern components operate at the highest level of efficiency. But significant effects can also be achieved by modifying or upgrading existing compressors. BOGE offers various retrofit kits that increase the efficiency of existing systems by up to 10 percent.



TREATMENT

Compressed air filters also use energy, indirectly: if two filters have a differential pressure of 0.5 bar each, the required network pressure will increase by one bar – and six percent more energy will be consumed. The following motto therefore holds true with regard to treatment: as much as necessary, as little as possible. In many cases it proves beneficial to have a centralised basic treatment system with decentralised dryers or filters at the point of use. Timely servicing is also important, since dirty filters raise the differential pressure and thus increase energy consumption.

HEAT RECOVERY

If the heat generated in the compression process is used elsewhere, this does not make the compressed air itself any cheaper, but you will make considerable savings in heating costs, for example, or in process water heating.

Eliminate faults in the system: Many losses in efficiency can be traced back to a faulty system configuration. The network is operated at too high a pressure, the idle times are excessive, the treatment process is too elaborate, or there is no heat recovery system. In order to utilise the full potential of your system, a comprehensive energy assessment is required, followed by system-oriented optimisation. Between 30 and 50 percent of the energy can be saved in this way.

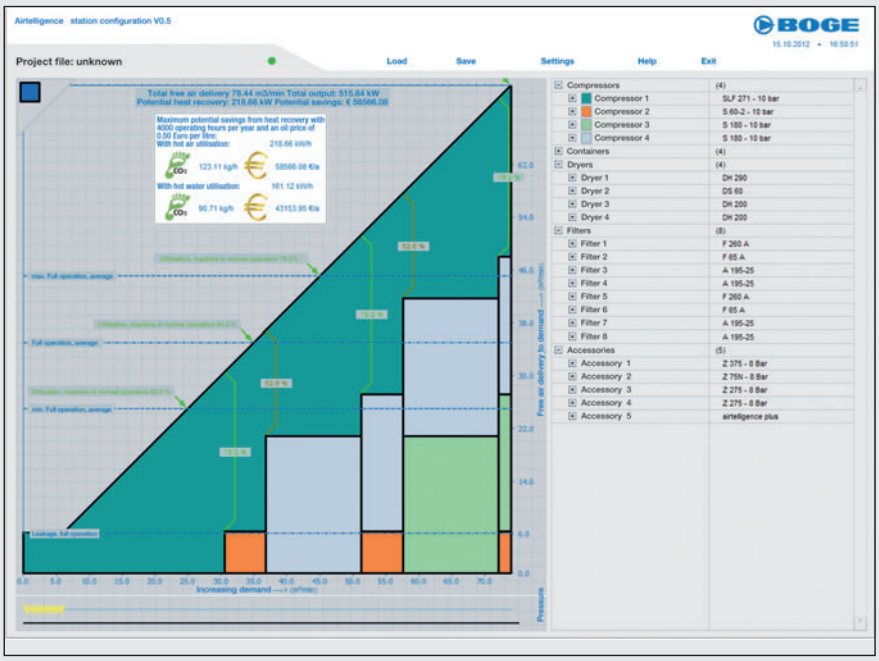
EXAMPLE 1: EFFICIENT OVERALL SYSTEM CONFIGURATION IN CAR BODY PRODUCTION.

INITIAL SITUATION:

No data or tools were previously available in car body production to provide transparent information on the amount of energy consumed in connection with the use of compressed air. The generation, distribution and use of compressed air were only partially coordinated with each other. Working within the framework of the "Green Carbody Technologies" (InnoCaT)* innovation alliance, BOGE cooperated with Festo AG, Volkswagen AG and the Fraunhofer-Institut für Werkzeugmaschinen und Umformtechnik to systematically analyse and redesign the process chain.

THE OBJECTIVE:

To achieve energy savings of 30 to 50 percent by improving coordination between the generation and consumer sides, configuring the plant using simulation techniques, monitoring energy consumption, and adapting operating concepts.



Examining the entire system makes it possible to configure all of the components efficiently. Potential savings can be calculated long before actual production begins.

The measures:

- **Collection of data:** Energy consumption at production hall level, compressed air generation and distribution at factory and production hall level, compressed air consumption at plant and component levels
- **Development of software tools** to allow holistic analysis and optimal dimensioning of the compressed air distribution and generation systems, and to calculate energy consumption and costs for the entire service life
- **New design of the entire functional chain** of the compressed air system with systematic highlighting of potential areas of optimisation: plant model (consumer), network model (distribution), generation model (compressor station, including heat recovery)

The result:

- The tools developed make it possible, even two or three years before production actually commences, to employ systematic planning for the purpose of calculating and optimising the entire compressed air functional chain.
- 35 percent savings in energy are possible with reasonable outlay costs for optimisation measures and can be easily achieved in the case of newly designed plants.
- The relevant levers that can be used to improve energy efficiency were determined and summarised in a planning guideline for car body production.

* This research and development project was subsidised by the German Federal Ministry of Education and Research (BMBF) as part of the “Research for the production of tomorrow” programme and was managed by Projektträger Karlsruhe (PTKA). The author is responsible for the content of this publication.

New system, new advantages.

How modern components improve your energy efficiency.

PREMIUM COMPONENTS FOR THE GREATEST EFFICIENCY.

END TO END EFFICIENCY:
BOGE EFFILENCE PREMIUM AIREND.

Perfectly smooth running, optimal design of performance ranges, lowest possible performance losses and high volumetric efficiency: these are the trademarks of the effilence premium airend made by BOGE. Its core component, the in-house developed 5:6 screw profile of the rotors, makes the BOGE effilence the most efficient airend ever built by BOGE. The peripheral speed is optimally designed and is significantly lower than that of previous compressors. This reduces the losses in efficiency caused by churning, the stages are quieter and the service life of the bearings is extended.

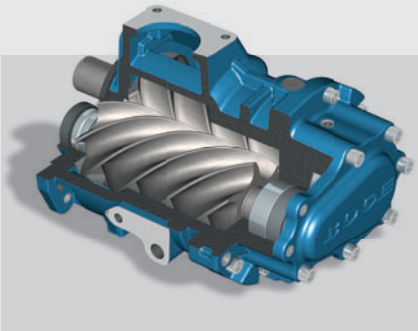
SAVE UP TO 35 PERCENT OF THE ENERGY USED IN THE OVERALL SYSTEM:
WITH THE BOGE S SERIES.

With the S series, you can save up to 35 percent of the energy used in the overall system. The reasons for this include:

- The highly efficient BOGE effilence airend
- "Premium efficiency" class IE3 motors, with "super premium" class IE4 available on request
- The latest generation focus control system
- Fan with frequency converter (optional)

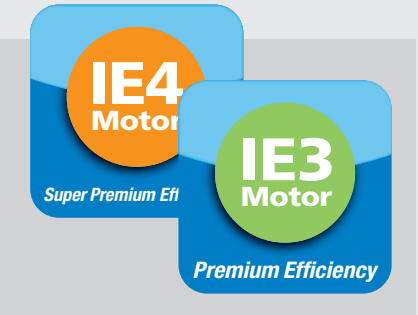
HIGHLY EFFICIENT DRIVES:
BOGE IE3 AND IE4 MOTORS.

In the case of electric motors, approximately 90 percent of the total costs accrued throughout their service life are attributable to electricity consumption. In most cases, therefore, it is worth insisting on motors of the highest efficiency class, since the additional cost will soon pay for itself. BOGE equips all its standard S series machines with "premium efficiency" motors that comply with class IE3, which will be a statutory requirement from 2015 onwards. Users can also opt for "super premium" class IE4 motors.



With its innovative profile geometry (5:6 screw profile), the BOGE effilence maintains a low differential pressure between the chambers and thus achieves excellent volumetric efficiency.

You would find it difficult to generate compressed air more efficiently than with BOGE's S series machines.

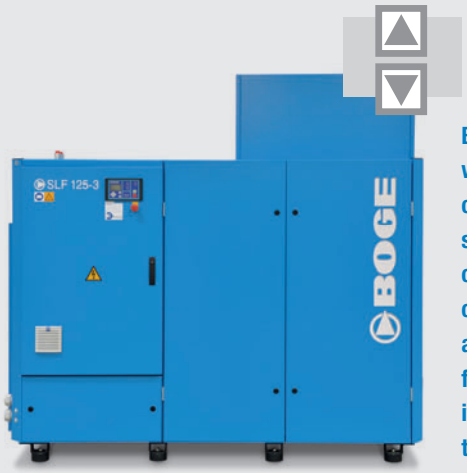


Motors belonging to the highest efficiency classes, IE3 and IE4, reduce the electricity consumption of your compressor.

Bottom-line benefits: Around three quarters of the life cycle costs for a compressed air station are energy costs. When deciding to make an investment, therefore, you should not be guided by the purchase price – it is actually the follow-up costs during operation that are of consequence in the long run. Modern components with the highest efficiency ratings provide a quick return on investment.

ALWAYS ADJUSTED TO SUIT THE DEMAND: COMPRESSORS WITH INTEGRATED FREQUENCY CONTROL.

In situations where the compressed air demand fluctuates significantly, where the storage volume is small, or where peak load operation is required, the most energy-efficient mode of operation is achieved using continuously variable motor-speed controls that adjust the free air delivery of the compressor. In frequency-controlled compressors, the frequency converter takes on the task of flexibly adjusting the rotational speed of the driven motor and thus also of the airend. In this way, the machine delivers only the amount of compressed air that is actually required at the time – this allows energy savings of up to 15 percent to be made!



BOGE's frequency controlled SLF machines with a direct drive and frequency controller offer an extremely flexible system that reacts spontaneously to changes in the operator's compressed air demand. If the pressure value changes, the free air delivery is synchronised automatically. A temperature-controlled frequency converter can also be supplied, if required, to adjust the fan output to match the actual demand for cooling air.

MAINTAIN EFFICIENCY: WITH BOGE ORIGINAL PARTS.

The efficiency of a compressor is dependent on the optimal coordination of its components. Replacement parts and wearing parts (such as separator cartridges and oil filters) that do not comply exactly with the manufacturer's specifications can increase the differential pressure inside the compressor, which then has to be overcome by using additional energy. The service life and servicing intervals are also negatively influenced. BOGE original parts guarantee the efficiency of a BOGE compressor in the long term. Our filters, separator cartridges and lubricants are optimally coordinated to function perfectly with our compressors and are always of the highest quality.

BOGE SYPREM S is a fully synthetic coolant and lubricant. It extends the service life of the airend and need only be replaced after 9000 operating hours – absolutely characteristic of BOGE original parts!

Treat yourself to a bit of airtelligence!

Intelligent controls guarantee efficient operation.

BOGE MASTER CONTROLS.

TRINITY:
FOR UP TO THREE COMPRESSORS.

The **tri**nity base load control system controls up to three compressors, of the same or similar size, in combination. The adjustable base load switching cycle enables the load to be divided equally between all of the compressors. In addition to the cyclic switching of priorities, the weekly timer provides you with 26 channels for freely selectable priorities (including shut-downs, e. g. at night). A generously sized, back-lit LC screen gives a clearly structured overview, in clear text, of the operating status and operating parameters (including the current network pressure and the programmed pressure switch points). Existing networks can be easily retrofitted with the trinity control system.

AIRTELLIGENCE PLUS:
FOR UP TO SIX COMPRESSORS.

With the airtelligence plus you can control a combination of up to six fixed speed or frequency-controlled compressors to meet varying demands. You can switch compressors at cyclical intervals. Alternatively, the weekly timer offers you 50 channels with which you can freely program the compressor loads. The LC colour display, with a 4-inch diagonal and widescreen format, gives a clearly structured overview of the operating status and operating parameters. As a further plus with these controls: the compressors are connected directly to the BUS interface, ensuring maximum convenience and minimum wiring. The controls can be operated easily and intuitively, in 15 different languages.

AIRTELLIGENCE PROVIS 2.0:
FOR UP TO 16 COMPRESSORS.

The **air**telligence provis 2.0 unites two advantages in one control unit: efficiency and transparency. Up to 16 compressors and up to 24 additional accessory components can be controlled with supreme efficiency. In addition, the **air**telligence provis 2.0 comes with browser-based visualisation, which can be integrated into your existing server structure via an Ethernet interface. Trends relating to pressure history, compressor status, free air delivery and pressure dew point can then be displayed directly on your PC screen. You can also opt for the “Pro” visualisation, which includes comprehensive alarm management and remote monitoring options. The controls are operated easily and intuitively using the high-quality 9-inch TFT colour display with LED backlight and touch facility.

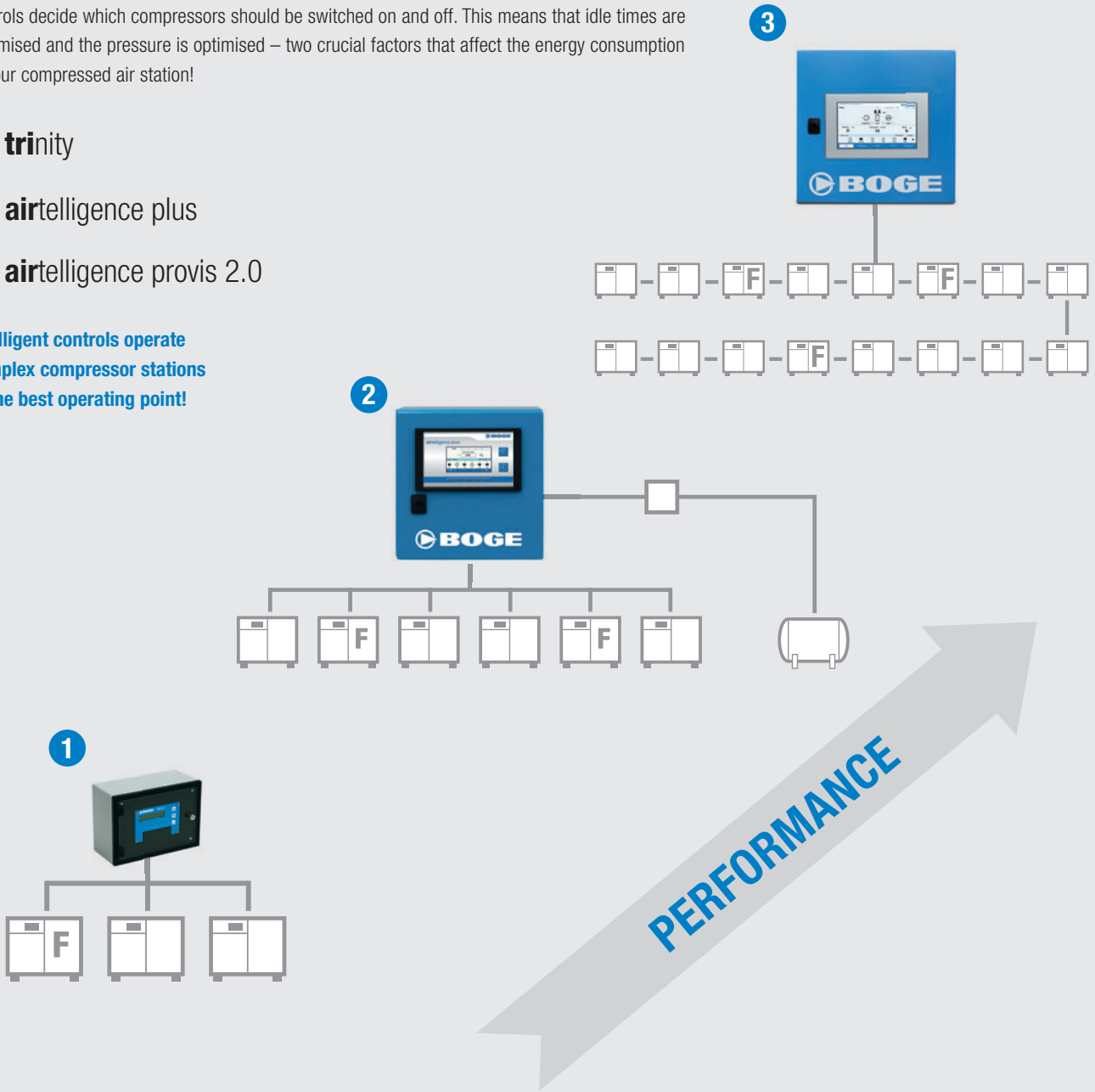
Always operate at the best operating point: If you are operating several compressors within a network, then intelligent master controls are absolutely essential. These controls decide automatically which combination of compressors should be running in order to meet the demand at that moment, so that the idle times, the pressure and therefore also the costs can be optimised. The BOGE airtelligence series offers master controls for 3 to 16 compressors.

EFFICIENCY IS A QUESTION OF CONTROL!

The **air**telligence range from BOGE:
Intelligent master controls for up to 3, 6, or 16 compressors. Based on the actual air demand, the controls decide which compressors should be switched on and off. This means that idle times are minimised and the pressure is optimised – two crucial factors that affect the energy consumption of your compressed air station!

1. **tri**nity
2. **air**telligence plus
3. **air**telligence provis 2.0

Intelligent controls operate complex compressor stations at the best operating point!



Warmly recommended.

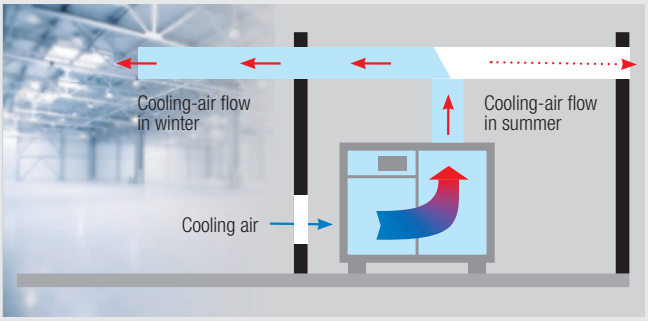
Utilise the maximum amount of energy with a heat recovery system

DIFFERENT METHODS OF RECOVERING HEAT.

Different heat recovery methods can be employed depending on the type of compressor and the type of intended use.

1. USING THE WARM COOLING-AIR FLOW.

This method takes advantage of the fact that the heat generated by the motor and the compression process leaves the screw compressor in a stream of warm air. This cooling air can be used to heat rooms or production buildings. All that is required in this case is an exhaust air duct that connects to the cooling air outlet of the compressor. This is the simplest way to recover heat – you immediately save energy that would otherwise have had to be consumed by the building's heating system.



All BOGE screw compressors are sound insulated and equipped with an internal fan. This means that they can be connected to a heating duct system without any problems. Compressors that are not enclosed (e.g. most piston compressors) can be converted for heat recovery by fitting a specially adapted sound hood. In addition, heat exchangers can be installed in the ducts and used to heat process water.

2. USING THE LIQUID COOLING MEDIUM.

Whether the liquid in question is the oil in **oil-lubricated compressors** or the water in water-cooled, oil-free screw compressors – in both cases, the liquid cooling medium removes the heat that is generated in the compressor during the compression process.

In the case of **oil-injected screw compressors**, a heat exchanger can now be connected into the main flow of hot oil. With this method, water can be heated to a temperature of up to 70 °C for use elsewhere in the building.

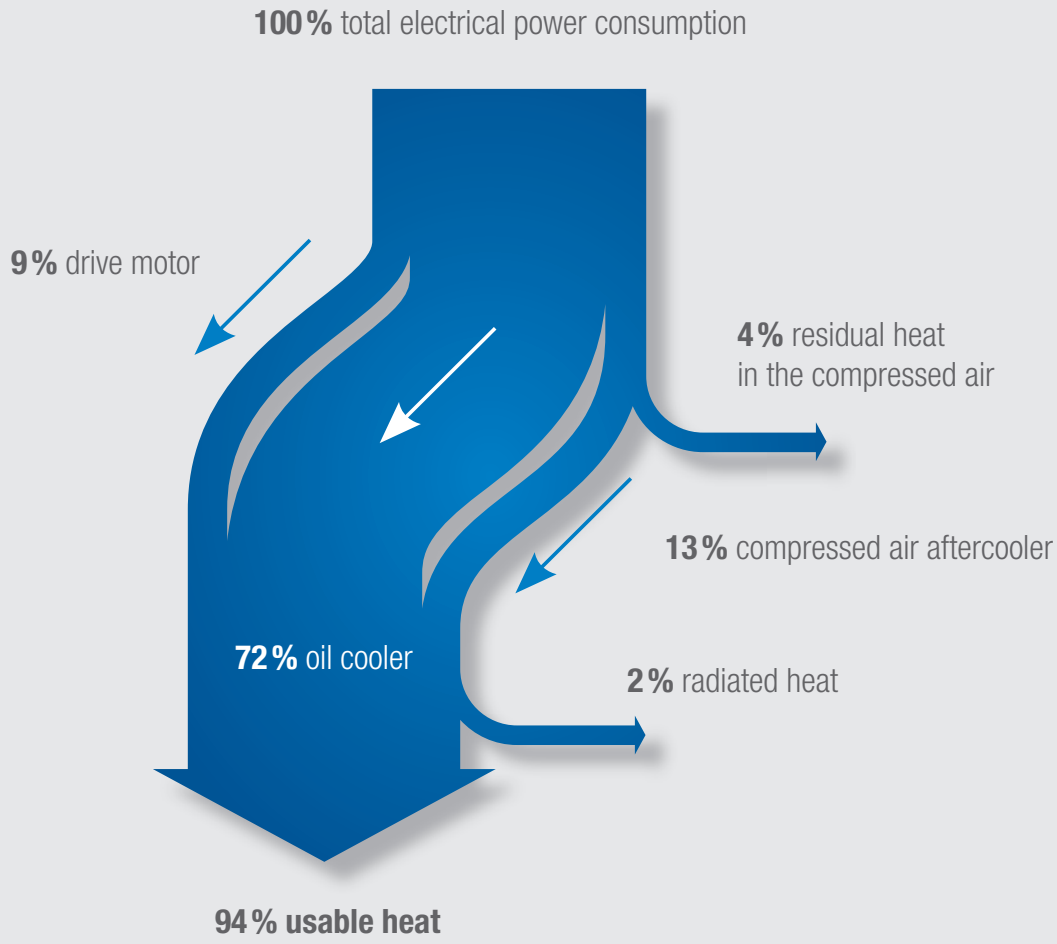
For **oil-free screw compressors** from the SO series, BOGE offers various heat recovery systems. In this case, the heat can be transferred via a heat exchanger to the cooling water circuit and/or to a separate circulatory system for process water.

Possible areas of application:

- Heat for industrial processes
  - Preheating process water
  - Drying
  - Refining
  - Disinfecting
  - Cleaning
- Absorption chillers
- Heating systems
- Hot water for sanitary facilities
- Hot water as drinking water

Heat is energy: Most of the energy consumed by a compressor is converted into heat and then removed via a cooling medium (such as air, water or oil). In an efficient compressed air system, this heat is not lost, but used for other applications within the factory that require heat. Up to 94 percent of the energy used to operate a compressor can be recovered in this way and used to make savings in other areas.

GREAT POTENTIAL, GREAT EFFECT!



Of the 100 percent of the mechanical energy applied to a screw compressor, an average of 2 percent is lost as heat radiation, while a further 4 percent remains in the compressed air as residual heat.

Most of this energy, however – namely 94 percent – is essentially available in the form of usable heat energy.

Saving can be as easy as this.

Examples of cost calculations for efficiency-enhancing measures.

BE A HEAT PRESSURE WINNER!

BOGE DUOTHERM

- Specially designed for retrofitting existing screw compressors
- Saves money by efficiently recovering waste heat
- Up to 72 percent of the energy used by the compressor is available in the form of heat energy, for heating up process water and central heating water, for example
- Compact, space-saving and easy to install
- **Also compatible with other brands**

THE BOGE DUOTHERM WINNING FORMULA!

$$\frac{\text{quantity of usable heat} \times \text{operating hours of compressor} \times \text{fuel oil price}}{\text{calorific value of the oil} \times \text{heating efficiency}}$$

= potential savings per year*

*The following values were assumed for the purpose of these examples: fuel oil price per litre = € 0.80; calorific value = 9.861 kWh/l; heating efficiency = 70 %. The amount of usable energy varies depending on the compressor and the specific situation.

Would efficiency measures be worth your while? In most instances the answer is: yes. In any case, BOGE's experts can calculate your potential savings and determine the payback period fairly accurately well before you commit to the investment. The following examples demonstrate this with reference to external heat recovery using BOGE DUOTHERM. We look forward to helping you save!

BOGE S 150

- Power output of drive motor: 110 kW
- Usable quantity of heat: 88,8 kW

Your potential savings*
based on 3 000 operating hours:
30 875 €
based on 8 000 operating hours:
82 333 €

BOGE S 100-2

- Power output of drive motor: 75 kW
- Usable quantity of heat: 60,6 kW

Your potential savings*
based on 3 000 operating hours:
21 070 €
based on 8 000 operating hours:
56 187 €

BOGE S 75-2

- Power output of drive motor: 55 kW
- Usable quantity of heat: 44,4 kW

Your potential savings*
based on 3 000 operating hours:
15 437 €
based on 8 000 operating hours:
41 167 €

BOGE SD 60-2

- Power output of drive motor: 45 kW
- Usable quantity of heat: 36,3 kW

Your potential savings*
based on 3 000 operating hours:
12 621 €
based on 8 000 operating hours:
33 656 €

BOGE S 50-2

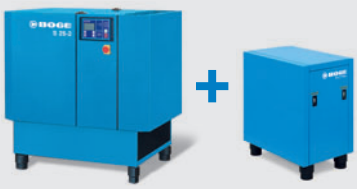
- Power output of drive motor: 37 kW
- Usable quantity of heat: 29,9 kW

Your potential savings*
based on 3 000 operating hours:
10 396 €
based on 8 000 operating hours:
27 722 €

BOGE S 29-2

- Power output of drive motor: 22 kW
- Usable quantity of heat: 17,8 kW

Your potential savings*
based on 3 000 operating hours:
6 189 €
based on 8 000 operating hours:
16 504 €



* per year, with BOGE DUOTHERM

BOGE
COMPRESSED AIR SYSTEMS

BOGE AIR. THE AIR TO WORK.

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Best Of German Engineering

All around the globe, customers place their trust in premium compressed air systems with the BOGE brand name. These four letters stand for more than just the name of our company founder. BOGE also stands for the Best Of German Engineering – because we have been putting our experience in innovative solutions and outstanding products into action for four generations and for more than 100 years. Those who favour German engineering ingenuity opt for BOGE quality – worldwide.

OUR RANGES OF SERVICES INCLUDE THE FOLLOWING:

- Energy efficient systems development
- Plant design and engineering
- System control and visualisation
- Oil-free piston and screw compressors
- Oil injected screw compressors and oil lubricated piston compressors
- Compressed air treatment
- Compressed air distribution and storage
- Compressed air accessories
- Compressed air service

GL ISO 9001 ISO 14001
GL Systems Certification

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