

**BOGE AIR. THE AIR TO WORK.**



# **SCREW COMPRESSORS**

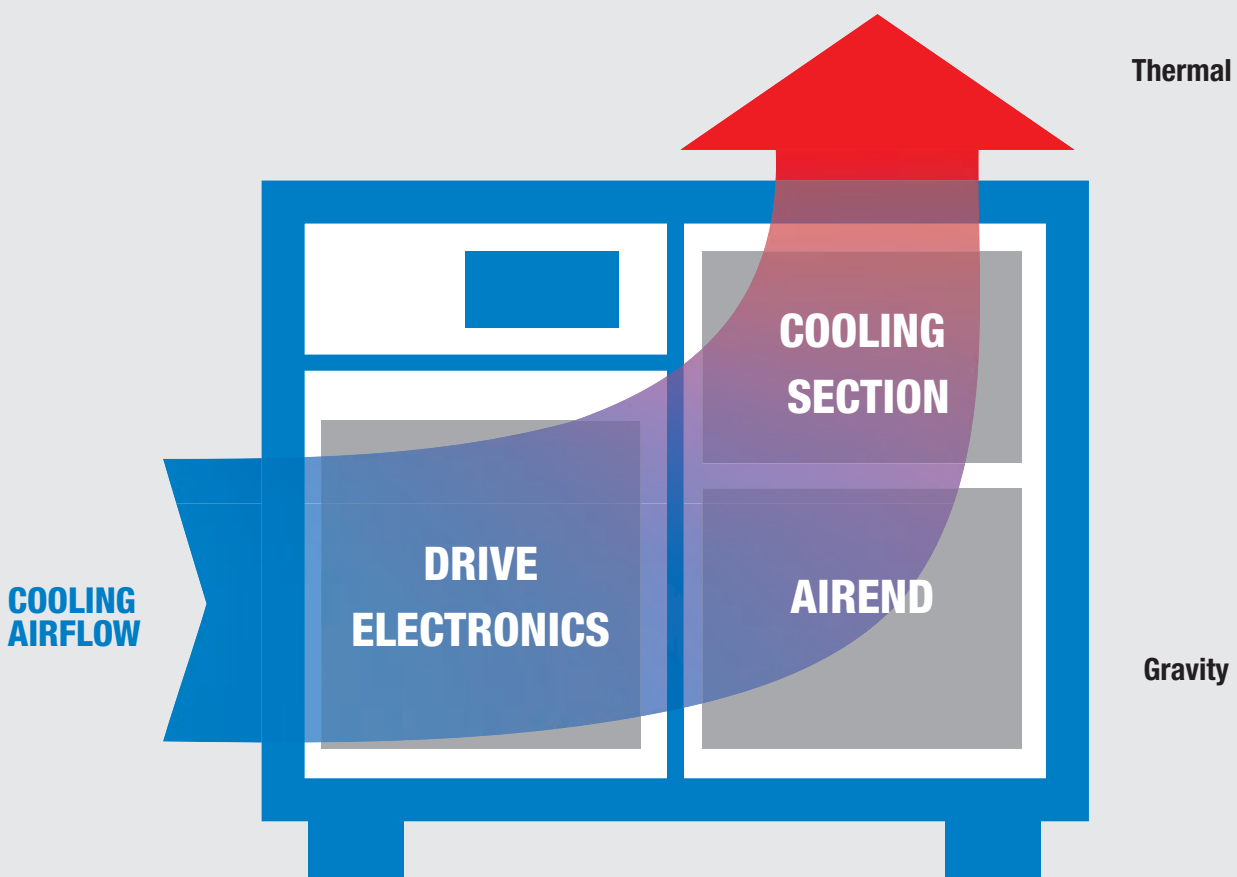
Over 100,000 compressed air users expect more when it comes to their compressed air supply.

## **BOGE air provides them with the air to work.**

For more than three decades BOGE screw compressors “Made in Germany” have stood the test of time: in industry and trade - from the one-man workshop to the automotive industry and the large refineries. Today, BOGE screw compressors have much more to offer than just compressed air: state-of-the-art technology, a modular design concept and maximum energy efficiency ensures that they meet the high reliability and efficiency standards customers have come to expect from BOGE.

# Nature does not waste energy.

Our screw compressors are also built using this principle.



**Intelligent engineering from BOGE:** The three main sections of the BOGE screw compressor (electronics & drive, compressor, independent cooling unit) are strategically aligned in the main cooling air flow: for maximum efficiency and service life.

**Efficiency made easy:** According to our engineers, the design of the BOGE screw compressor is very much based on the principles of nature. High outputs, effective oil separation, and an extremely long service life of the component parts ensure that energy consumption is optimised.

## **THERMAL ADVANTAGE: THE BOGE COOLING AIR FLOW.**

**Warm air rises:** Our engineers harnessed this simple law of physics in order to make BOGE screw compressors even more efficient and to prolong their service life. Cooling air is taken in at the lowest point in the package by a separate cooling air fan and is drawn over the component parts upwards before leaving the compressor at the highest point – our so called chimney effect. This main cooling air flow is many times higher than the actual cooling air flow of the integrated motor fan. Due to chimney principle, the system keeps cooling even during load reversal.

**Efficiency advantage:** The intake filter is positioned in the coolest part of the cooling airflow and takes in the air for compression at the lowest temperature. This results in an optimised volumetric efficiency and output from the compressor. The air/oil cooler, on the other hand, is positioned at the top of the compressor station. The cooler is generously dimensioned and, in conjunction with the cooling airflow, provides for the lowest possible internal cabinet temperature as well as discharge compressed air temperature. When connected directly to ducting, the cooling air can be removed without any problems or recovered and easily redirected to supplement space heating.

**Service life advantage:** Motor, switch cabinet and all electric components are positioned at the intake of the main cooling airflow and benefit from the coolest air. As a result these components do not overheat either in load or in idle mode which means their service life is extended considerably. There are no heat sinks within the cabinet in either operating mode.

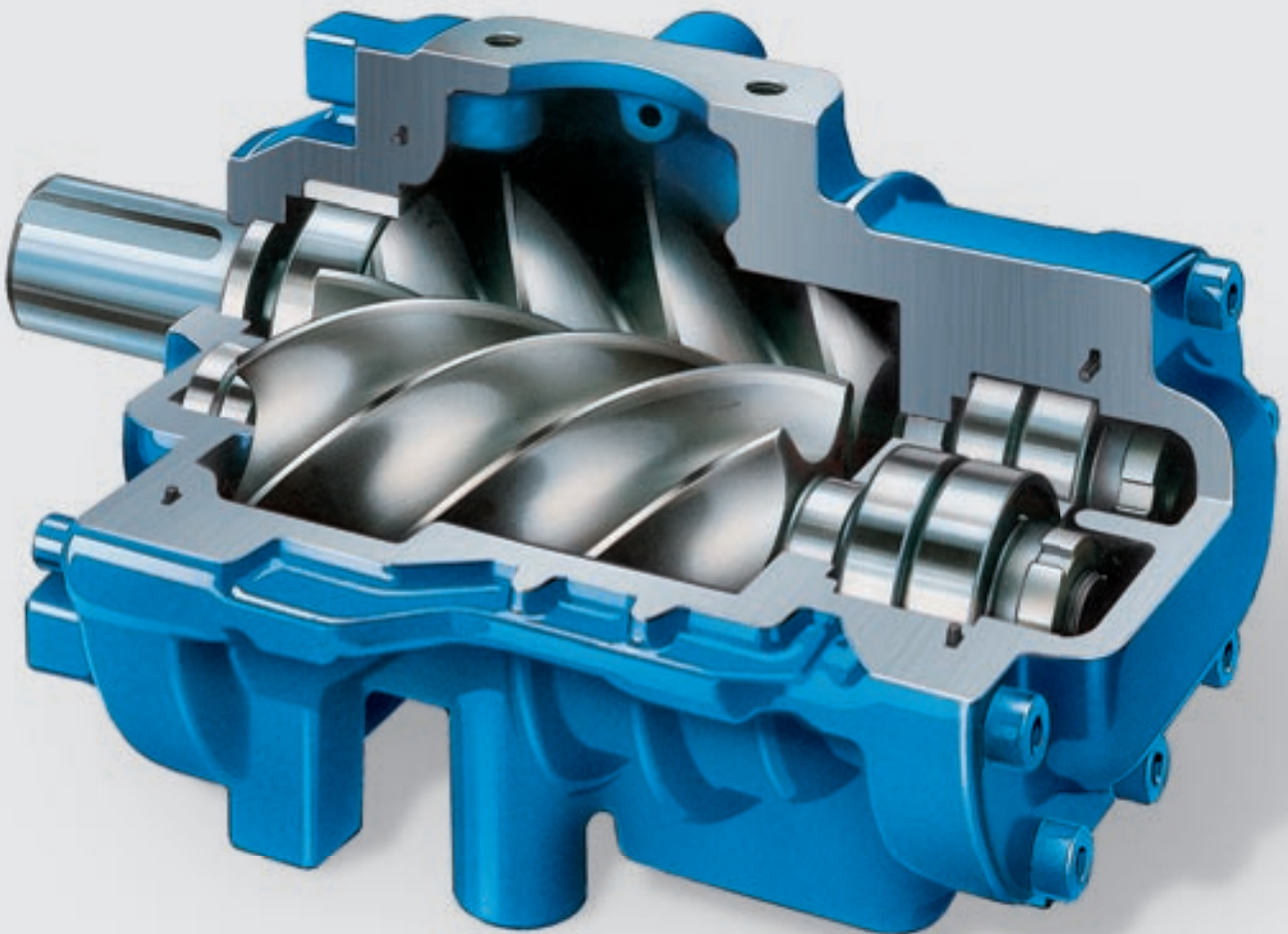
## **GRAVITY ADVANTAGE: THE BOGE OIL SEPARATION SYSTEM.**

**Oil always flows to the lowest point:** Therefore our engineers have positioned the oil pre-separator horizontally at the lowest point of the system. Also due to rapid reduction of the compressed air speed after compression bulk oil "rains" from the compressed air into the reservoir – a most efficient form of oil pre-separation.

**Efficiency advantage:** The BOGE oil separation system is designed to minimise internal pressure losses and to ensure a residual oil content of 1-3 mg/m<sup>3</sup> in every operating phase. The horizontal combi-tank ensures a low foam level at load reversal virtually eliminating the risk of bulk oil reaching the separator cartridges.

**Long-life service advantage:** BOGE oil separator cartridges have a long service life – not only as a result of the highly effective oil pre-separation but also because of the large safety distance between the oil surface and the separator that prevents the oil from migrating into the separator cartridge.

Quality in its most efficient form:  
**The BOGE airend.**



**The heart of every BOGE screw compressor:**  
The reliable and efficient airend.

**Everything is cutting edge:** The BOGE airend is the heart of the BOGE screw compressor. Engineered to exacting tolerances the BOGE airend combines quality and efficiency with long service life making it one of the best of its kind and a sound long-term investment for our customers.

## PREMIUM QUALITY MADE IN GERMANY

### Maximum reliability

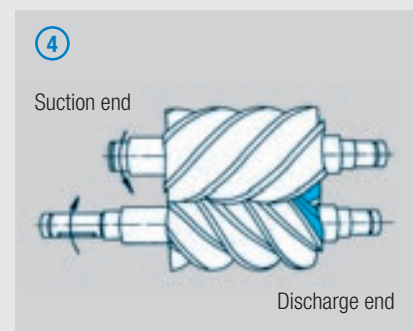
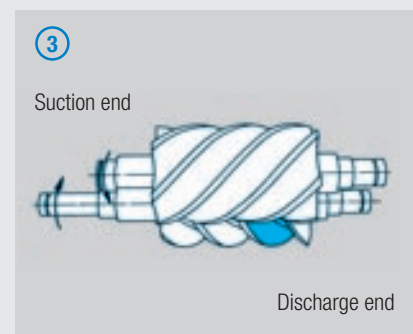
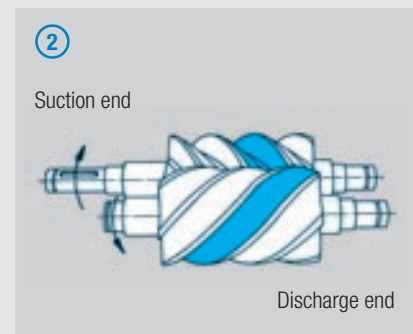
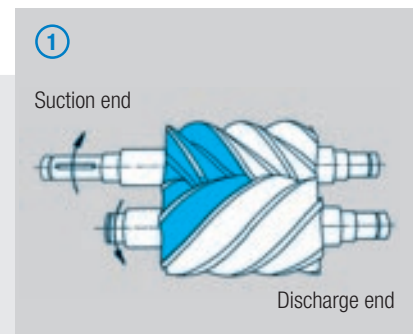
BOGE airends are manufactured on state-of-the-art production lines and are examples of the finest German engineering. Lowest manufacturing tolerances combined with quality materials ensures the dependability of each airend. Computer controlled testing further ensures that every single airend meets our high quality standards. The longest possible service life is also assured thanks to generously dimensioned axial and radial bearings.

### Maximum efficiency

The screw profile of the BOGE airend has been optimised using the latest technological advancements providing maximum efficiency over the entire service life. We calculate the best possible specific power characteristics of each airend to ensure the best output per kW of power whilst ensuring the airend continuously operates at its optimal speed.

## THE COMPRESSION PROCEDURE

- ① **Intake:**  
The air passes through the intake opening into the rotors that are open on the suction side.
- ② ③ **Compressing:**  
As the screw rotates the air intake opening closes. The volume in the chambers is reduced and pressure increases. During this procedure, oil is injected to lubricate the rotor bearings, to seal the rotors, and to dissipate the heat of compression.
- ④ **Discharge:**  
Compression is completed, final pressure is reached, and discharge starts.



# Energy prices cannot be controlled. But energy efficiency can.

## INTELLIGENT CONTROL

The BOGE control and monitoring concept is your key to more energy efficient operation. With BOGE you get a state-of-the-art control system; it can control and monitor the key parameters of up to 16 compressors whilst optimising off load and idle times by using the most energy efficient combination of compressors to ensure the optimum output at the required pressure.

**Optimised output:**  
**BOGE compressor controllers.**

### BASIC

The BASIC controller displays five parameters as well as fault and maintenance messages and coupled with modern pressure sensors to reliably retrieve the pressure values. The BASIC controller can be programmed to ensure optimum operation of a compressed air system in line with the actual demand.



### FOCUS

FOCUS is the latest generation of BOGE energy efficiency compressor controllers. A large sized back-lit LC display, including clear text display, highlights error/maintenance messages, working conditions as well as the relevant operating parameters. In addition, both the operating

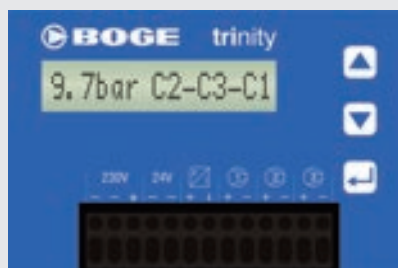
status of frequency controlled and fixed speed compressors is displayed. The FOCUS control will optimise load/idling times as well as downtimes – for ultimate compressed air efficiency.



**Synchronised output:**  
**BOGE Master controllers.**

### TRINITY

With the **trinity** controller from BOGE you can control up to three compressors of equal or different size or implement an automatic base load switching control. The adjustable base load switching cycle enables a constant load operation of all the installed compressors. **trinity** can be installed into the compressor switch cabinet or provided as a separate wall mounting cabinet version.



### AIRTELLIGENCE

**airtelligence** is designed to control up to 16 compressors of different makes and sizes in a multi-compressor system. It operates by selecting the appropriate compressor combination to meet the compressed air demand and to proficiently configure your system to ensure best possible operating efficiency: load/idle run switch cycles are minimised and expensive idle run times virtually eliminated. **airtelligence**: For a cost-effective and safe operation!



### AIRTELLIGENCE PROVIS

Seeing is believing: **airtelligence** PROVIS synchronises up to 16 compressors and visualises the central parameters. As a result energy costs can be closely monitored via an interface to a web server where you can view this data at anytime and anywhere around the world.



**Energy costs need not go off course:** because BOGE's energy efficiency solutions offer a number of options that save energy. It is calculated that energy costs account for around 75 percent of the lifetime costs of compressed air generation. This makes energy optimisation essential for any compressed air user. Significant sustainable savings can be created by continually auditing and optimising your installation. You should therefore rely on a partner who, as an energy expert, is ready and able to support you before and after your decision to purchase compressed air products. Welcome to BOGE!

## INTELLIGENT SAVINGS

### Perfectly controlled output: BOGE frequency controlled screw compressors

When there is a fluctuating compressed air demand, the BOGE frequency controlled screw compressors work strictly in accordance with the compressed air demand by producing the exact volume of compressed air at the pressure required.

The volume flow is continually adjusted between 25 and 100 percent – correctly specified frequency controlled compressors should eliminate expensive idling times and even out air demand fluctuations. Energy costs can therefore be reduced considerably.

When a frequency controlled compressor is used alongside a fixed speed compressor additional advantages can be achieved. The flexible speed adaptation of the air end also allows for pressure adaptation. Changing the pressure value of the frequency compressor automatically synchronises the output quantity. A 13 bar machine can therefore be transformed into an 8 bar machine yielding a correspondingly higher

output – without any expensive remodelling or design related modifications. All pressures and intermediate pressures are available with the best possible outputs.

It takes little or no investment for a compressed air user to save as much as 30 percent of their compressed air related energy costs. Be sure to take advantage of BOGE's energy efficiency solutions to save energy costs. Examples:

#### Leak detection

A single 2 mm diameter leaking hole causes losses of 260 l/min – this equates to several thousand Euros a year of energy costs.

Comprehensive leak detection from BOGE will identify any leaks within your compressed air network.

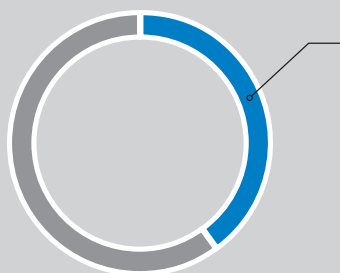
#### Heat recovery

Most of the energy used to generate compressed air is rejected in the form of heat. This heat can be recovered: e.g. for space heating or for the heating of domestic water. Up to 85 percent of the input electrical energy can be recovered: Our energy experts will be pleased to advise you!



#### AIReport

Does your compressor station still meet your specific site requirements? Oversized or obsolete components can be the source of high energy costs. The AIReport system helps to detect weak points within a compressed air system by monitoring compressed air generation, treatment and distribution over a set period of time (e.g. one week, two weeks or even a month): this tool will help you save energy!



#### Savings potential of up to 30 % is possible

with a frequency controlled compressor:

- minimised idling time
- pressure reduction
- load cycles virtually eliminated.



#### The BOGE sign for efficient compressed air solutions:

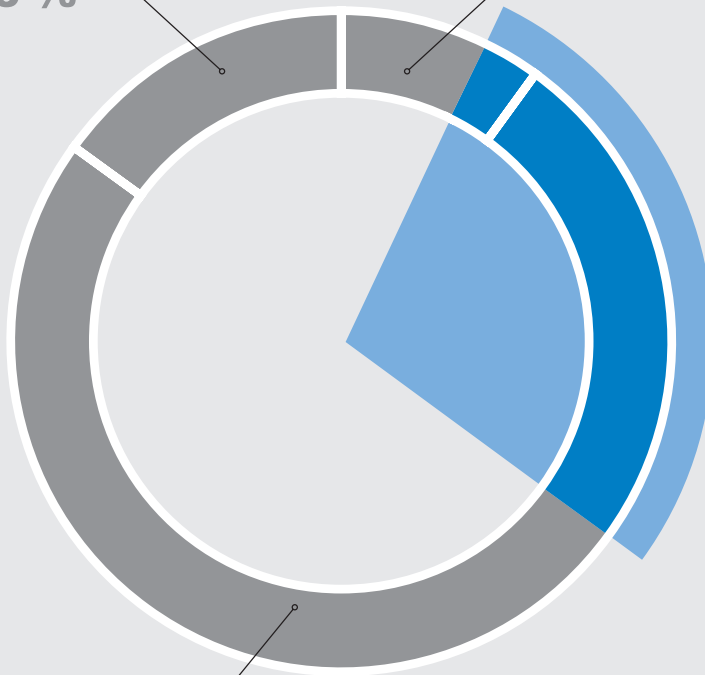
Wherever it is displayed, users can be assured of a particularly efficient BOGE solution helping to save a great deal of money!



# Why don't our compressors cost less? Because our customers can't afford that.

investment costs  
approx. 15 %

maintenance  
and repair  
approx. 10 %



energy costs  
approx. 75 %

**Your BOGE advantage:**  
More than a third of  
potential savings with  
regard to energy and  
maintenance costs are  
due to high quality  
components and  
efficient solutions!

## QUALITY PAYS OFF

Purchase costs represent only a small portion of a compressors life cycle investment costs. Because BOGE compressors are designed to provide trouble-free and efficient operation for a long period of time, they are in many cases the most cost effective solution below the line. It is therefore not without good reason that users around the world increasingly rely on premium quality made by BOGE!

**Industry and Trade deserve quality solutions:** And, our customers have come to rely on BOGE for uncompromising quality and intelligent engineering “Made in Germany”. More than 100,000 compressed air users around the world know that such values pay off in the long run: because a reliable, efficient and durable supply of compressed air is paramount to the operation of their business.



#### German engineering

The use of high quality materials and a reduced number of wear parts makes the BOGE product as efficient and reliable as our demanding customers rightfully expect. The entire BOGE production process is subject to permanent quality control – from inspection of incoming material to final inspection and testing – with all positions closely monitored by experienced quality officers. And when it comes to product development, BOGE ranks among the first for German engineering: Repeatedly our innovations are considered as industry trendsetters and are often protected by Worldwide patents.



#### Strict guidelines

The prototypes of newly developed BOGE products are subjected to all kinds of practical tests. For example fatigue tests under extreme conditions are carried out to determine the product's readiness for the market prior to release for series production. No BOGE product leaves the Bielefeld facility without completing a personal final inspection protocol. This document has to be signed off by our employee.



#### Permanent optimisation

All BOGE products are subject to permanent quality audits and assessed according to the latest industry standards and practical experience – which translates into continuous improvement for the benefit of our customers. You are welcome to contact our energy efficiency experts for more details on how to realise additional savings potentials in your compressed air system. Use the BOGE AIRreport or carry out leak detection in order to save ready cash:

**Please do not hesitate to contact us!**



#### BOGE IE3 motors: the new premium class

The new EN 60034-30:2009 standard was recently introduced to harmonise motor efficiencies. This standard divides three-phase low voltage motors into three efficiency classes – IE1 (standard efficiency), IE2 (high efficiency) and **IE3 (premium efficiency)** – and regulates the various energy standards for motors across the world.

Although not mandatory until 2015 within the EU, **BOGE motors already meet the ultra high criteria of Class IE 3** – for maximum efficiency and an optimum service life.

# The C-series up to 7.5 kW: Space saving and more energy efficient than ever!

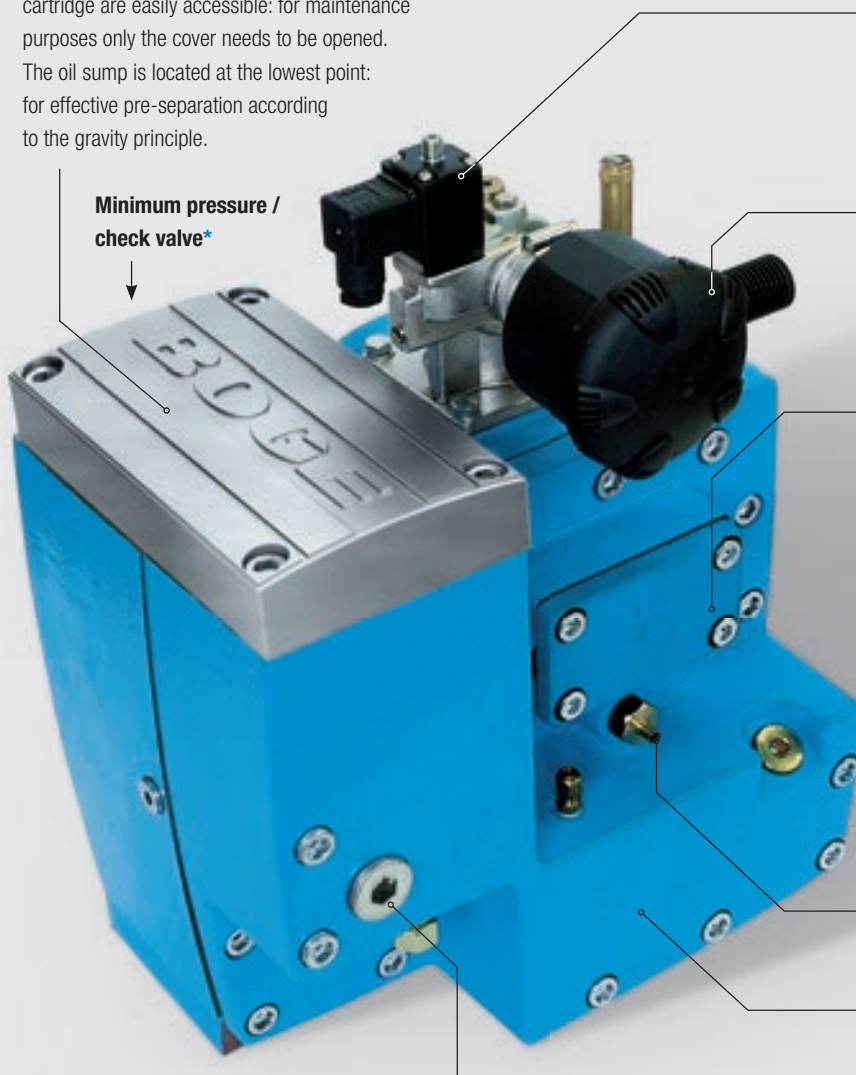
## Design advantages.

### THE CM COMPACT MODULE:

All necessary components are integrated into the airend block. Maintenance and wear parts are easily accessible – for maximum comfort and highest operational safety.

#### Integrated oil separating system

Both oil separating cartridge and oil filter cartridge are easily accessible: for maintenance purposes only the cover needs to be opened. The oil sump is located at the lowest point: for effective pre-separation according to the gravity principle.



**Multifunctional intake control with integrated solenoid valve** for functionally reliable operation without leakages.

**Silenced intake filter with paper filter cartridge**  
The filter separates 99.9 percent of all particles larger than 3 µm: assuring high quality compressed air right at its source.

**BOGE airend with special BOGE profile and HD bearing**  
The specially designed airend is characterised by its high output and low energy consumption.



**\* Minimum pressure / check valve**  
Integrated design eliminates piping – for maximum leakage safety.

**Temperature sensor**

**CNC machined cast iron housing**  
High quality machining eliminates the risk of leakage. The heavy cast iron housing also serves to reduce noise right at the source.

**Thermo-static oil level regulation**  
Easily accessible from the outside.

**Compact & highly efficient!** The monoblock compact design of the airend range up to 7.5 kW offers distinct advantages. The integrated design minimises the number of oil pipes by clever internal routing – for a highly efficient and reliable compressor. At the same time the airend requires less space providing the user with a compact, space saving and energy efficient solution from BOGE!



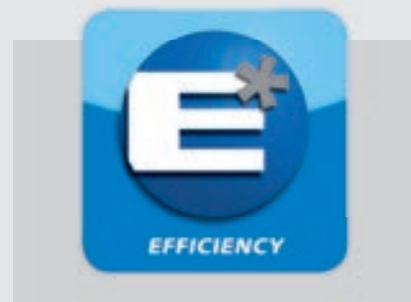
**COMPACT DESIGN**

Integration of all essential components eliminates almost all interconnecting pipes. Leakages are virtually eliminated. Internal pressure losses are minimised.



**EXTREMELY QUIET**

Because of the sound adsorbing graphite casting the C-series is very quiet in operation and vibration free. No further silencing is required. The canopy versions C-series and C-series with dryer are therefore super-silent with low sound pressure values.



**HIGHEST EFFICIENCY**

The BOGE airend design ensures industry leading specific power ratios (Optimised output volumes at low energy consumption).



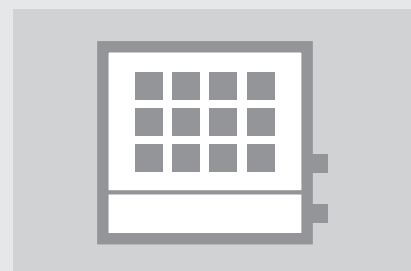
**CONTROL**

The compressor has BASIC control system with LC display and pressure transducer technology. FOCUS control is available as an option that offers additional monitoring and control features. FOCUS is also programmed to act as a changeover switch and can control up to three compressors.



**OPTIONAL FREQUENCY CONTROL**

The frequency converter flexibly controls the motor speed and therefore the airend. This ensures the compressor output automatically adjusts to the momentary demand. Soft starting via the frequency convertor also avoids undue wear and tear and prolongs the service life of the compressor.



**OPTIONAL REFRIGERATION DRYER**

The C-series can be equipped with a refrigeration dryer as an option – either top mounted on a compressed air receiver or horizontally mounted. No additional space is required for the generation of dry compressed air.

Screw compressor **C 3 L** to **C 7 L**  
Compressed air system **C 3 LR** to **C 7 LR**  
Compressed air centre **C 3 LD** to **C 7 LDR**

Effective free air delivery:  
0.234 – 0.728 m<sup>3</sup>/min, 8 – 25 cfm  
Pressure range: 10 and 13 bar, 150 and 190 psig  
Motor range: 2.2 – 5.5 kW, 3 – 7.5 HP



Screw compressor **C L**

Compact screw compressor, direct coupled



Compressed air system **C LR**

Receiver mounted screw compressor,  
direct coupled



Compressed air centre **C LDR**

Receiver mounted screw compressor  
and refrigerant dryer, direct coupled



The depicted machines do not correspond to the most updated version of the receivers.

BOGE Model	Max. pressure		Effective free air delivery* 50 Hz		Effective free air delivery* 60 Hz		Motor power		Dimensions W x D x H mm	Weight kg
	bar	psig	m <sup>3</sup> /min	cfm	m <sup>3</sup> /min	cfm	kW	HP		
C 3 L	10	150	0.240	9	–	–	2.2	3.0	755 x 485 x 495	105
C 4 L	10	150	0.340	12	0.31	11	3.0	4.0	755 x 485 x 495	110
C 4 L	13	190	0.234	8	–	–	3.0	4.0	755 x 485 x 495	110
C 5 L	10	150	0.545	19	0.40	14	4.0	5.5	755 x 485 x 495	125
C 7 L	10	150	0.728	25	–	–	5.5	7.5	755 x 485 x 495	130
C 7 L	13	190	0.525	19	–	–	5.5	7.5	755 x 485 x 495	130

\* Free air delivery figures in accordance with ISO 1217, Appendix C, at 20°C ambient temperature and maximum pressure. Emitted sound pressure levels from 61 dB(A) according to DIN EN ISO 2151:2009

BOGE Model	Max. pressure		Receiver volume Litres	Effective free air delivery* 50 Hz		Effective free air delivery* 60 Hz		Motor power		Receiver option Litres	Dimensions W x D x H mm	Weight kg
	bar	psig		m <sup>3</sup> /min	cfm	m <sup>3</sup> /min	cfm	kW	HP			
C 3 LR	10	150	90	0.240	9	–	–	2.2	3.0	270	1130 x 490 x 920	155
C 4 LR	10	150	90	0.340	12	0.31	11	3.0	4.0	270	1130 x 490 x 920	160
C 4 LR	13	190	90	0.234	8	–	–	3.0	4.0	270	1130 x 490 x 920	165
C 5 LR	10	150	90	0.545	19	0.40	14	4.0	5.5	270	1130 x 490 x 920	175
C 7 LR	10	150	90	0.728	25	–	–	5.5	7.5	270	1130 x 490 x 920	180
C 7 LR	13	190	90	0.525	19	–	–	5.5	7.5	270	1130 x 490 x 920	185

\* Free air delivery figures in accordance with ISO 1217, Appendix C, at 20°C ambient temperature and maximum pressure. Emitted sound pressure levels from 61 dB(A) according to DIN EN ISO 2151:2009

BOGE Model	Max. pressure**		Receiver volume Litres	Effective free air delivery* 50 Hz		Effective free air delivery* 60 Hz		Motor power		Dimensions W x D x H mm	Weight kg
	bar	psig		m <sup>3</sup> /min	cfm	m <sup>3</sup> /min	cfm	kW	HP		
C 3 LDR	10	150	270	0.240	9	–	–	2.2	3.0	1700 x 590 x 1130	225
C 4 LDR	10	150	270	0.340	12	0.31	11	3.0	4.0	1700 x 590 x 1130	230
C 4 LDR	13	190	270	0.234	8	–	–	3.0	4.0	1700 x 590 x 1130	250
C 5 LDR	10	150	270	0.545	19	0.40	14	4.0	5.5	1700 x 590 x 1130	245
C 7 LDR	10	150	270	0.728	25	–	–	5.5	7.5	1700 x 590 x 1130	250
C 7 LDR	13	190	270	0.525	19	–	–	5.5	7.5	1700 x 590 x 1130	270

\* Free air delivery figures in accordance with ISO 1217, Appendix C, at 20°C ambient temperature and maximum pressure. Emitted sound pressure levels from 61 dB(A) according to DIN EN ISO 2151:2009

\*\* Max. pressure of the compressor