



THE HEART OF FRESHNESS

SEMI-HERMETIC RECIPROCATING COMPRESSORS

NEW ECOLINE



Progress
all along
the line

50 Hz // KP-090-1 GB



HIGHLY EFFICIENT
WITH HIGH PERFORMANCE

The ECOLINE series is the creative further development of the proven robust and high performance semi-hermetic BITZER reciprocating compressors. It combines high efficiency, smooth operation, a broad range of application, a flexible choice of refrigerants, solid construction and high reliability.

The ECOLINE series is design know-how cast in metal representing over 75 years of development experience by the market leader in reciprocating compressor technology. It is the consequent further development based on several generations of BITZER compressors, starting with the BHS series via the .2 generation and the OCTAGON series.

The ECOLINE series is available across the entire performance range. It covers the full series of semi-hermetic reciprocating compressors and succeeds the predecessors with the same interface dimensions.

OPTIMISED BY IDEAS AND EXPERIENCE

The newly developed ECOLINE: a successful synthesis of well balanced drive gear mechanics, motors with high efficiency over a broad range, as well as optimised gas flow during the suction and compression process.

Together with minimum flow losses and reduced heat transmission from the hot gas to the suction gas side this results in the unique operating characteristics of the new ECOLINE series.

The ECOLINE cylinder head system: smooth operation of the optimised working valves – including the newly developed geometric concept of the discharge valves for minimal reexpansion – in conjunction with the newly shaped flow channels and coupled volumes.

Characteristic feature:

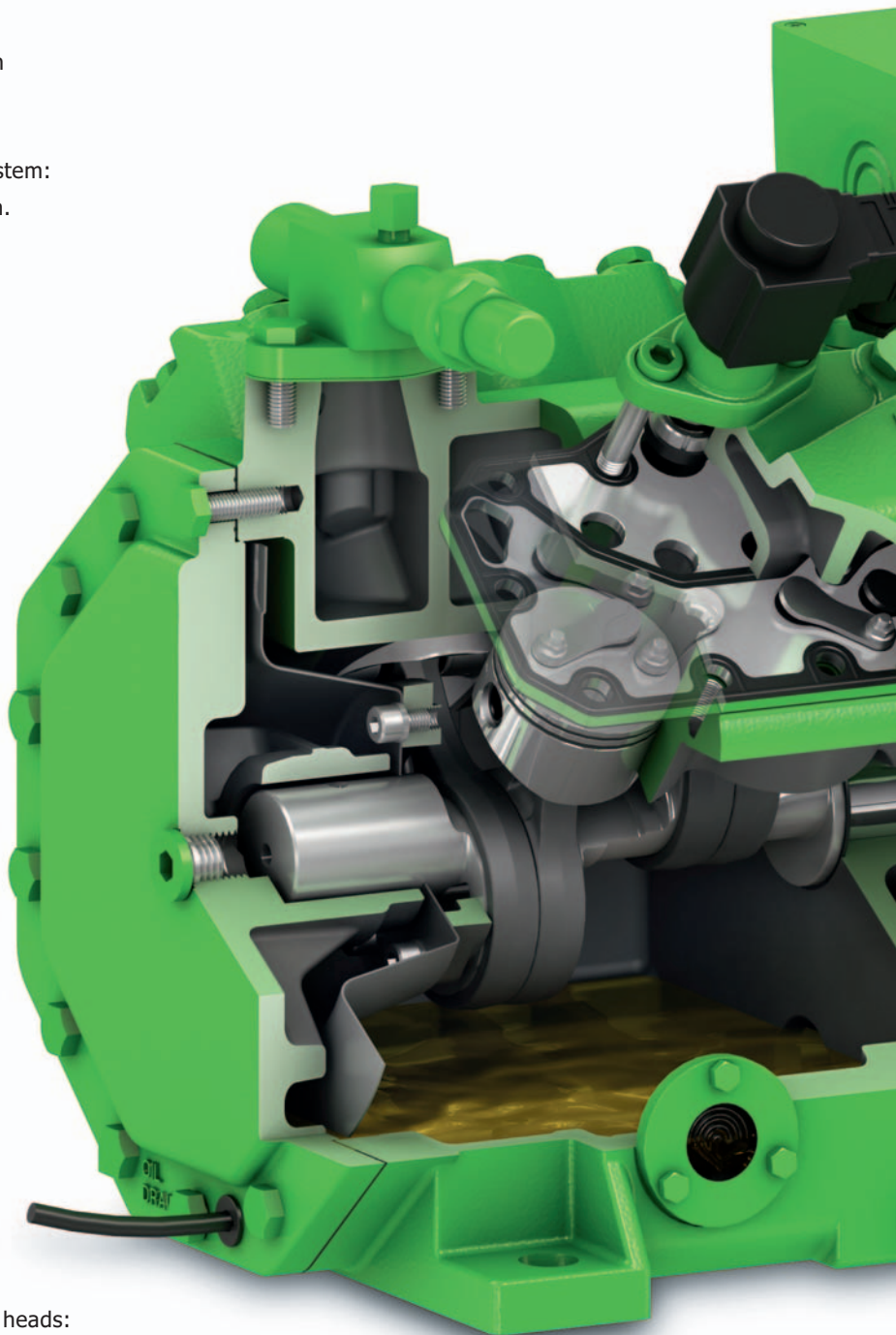
The newly designed cylinder head system.

NEWLY DESIGNED VALVE PLATE

// Newly developed geometric concept of the discharge valves for low reexpansion.

// High refrigeration capacity with minimum energy need.

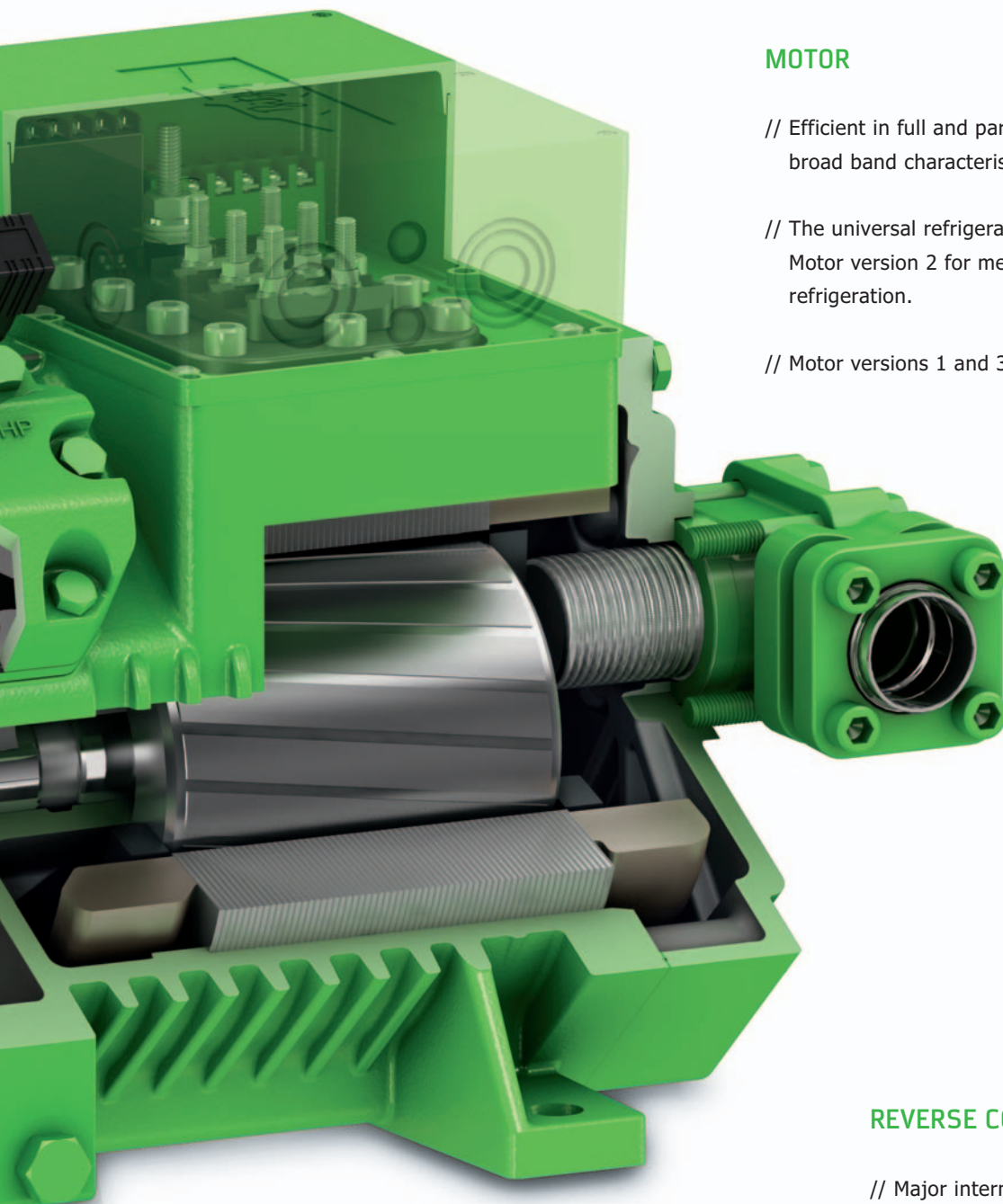
// The ECOLINE cylinder head system: smooth operation in interaction.



CAPACITY CONTROL

// The CR-System – fast cycling blocked suction
For example, 4-cylinder compressor with CR on both heads:
Control range 100% down to ~10%

// ECOLINE VARISPEED – integrated frequency inverter



MOTOR

// Efficient in full and part load due to broad band characteristics.

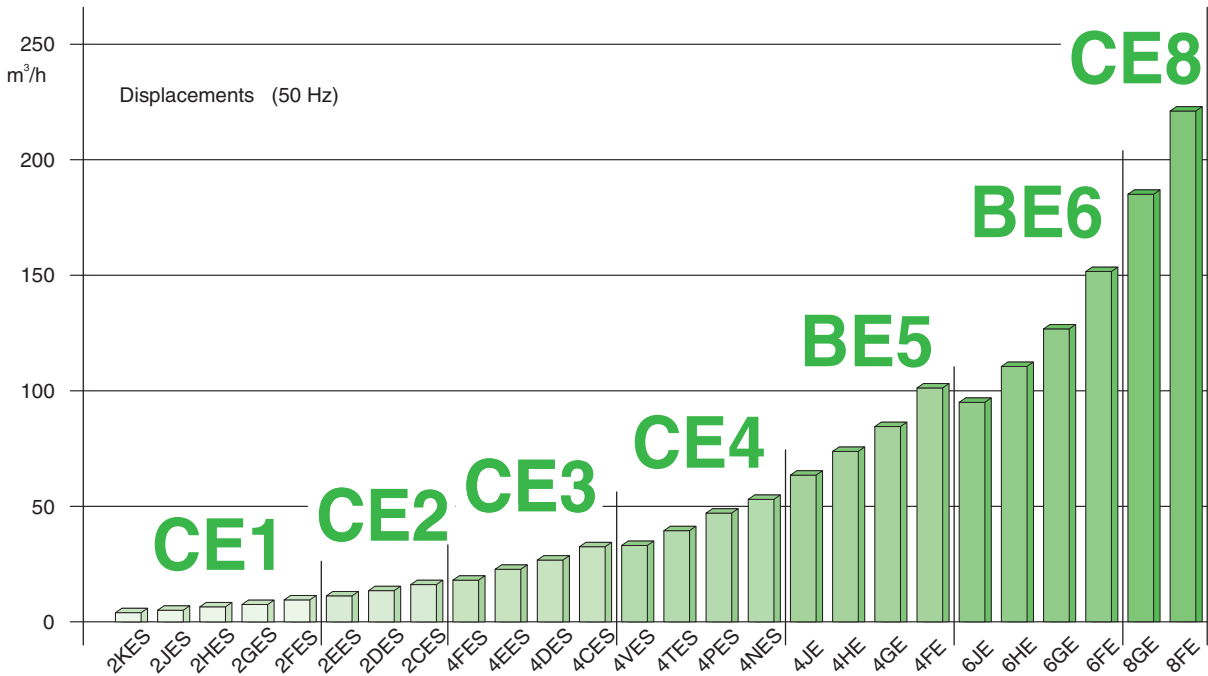
// The universal refrigeration compressor:
Motor version 2 for medium and low temperature refrigeration.

// Motor versions 1 and 3 for special applications.

REVERSE COMPATIBILITY

// Major internal components with complete redesign.

// Well known outside shape:
every ECOLINE is backward compatible.



THE NEW ECOLINE COMPRESSORS

The impact of refrigeration technology on the environment is increasingly in the focus of public discussion. The energy efficiency of refrigeration systems plays a crucial role here. The lower the energy consumption, the better the environmental balance and life cycle costs. Various regions (including the EU) therefore have a number of regulations and standards in force or preparation, which define minimum requirements in terms of energy efficiency.

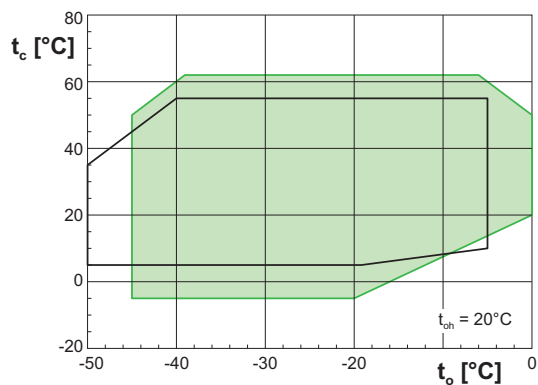
BITZER has always paid high attention to the efficiency of the compressors and introduced the ECOLINE for R134a a few years ago. R134a offers very favourable characteristics, especially for medium temperature refrigeration and heat pumps. This provides ECOLINE compressors, which can also be used at low condensing temperatures, with unrivalled seasonal energy efficiency.

Studies have shown that a hybrid variant with R134a for medium temperature in cascade with CO₂ low temperature refrigeration in supermarket applications results in low energy consumption as well as very favourable eco-efficiency (optimal life cycle costs and TEWI).

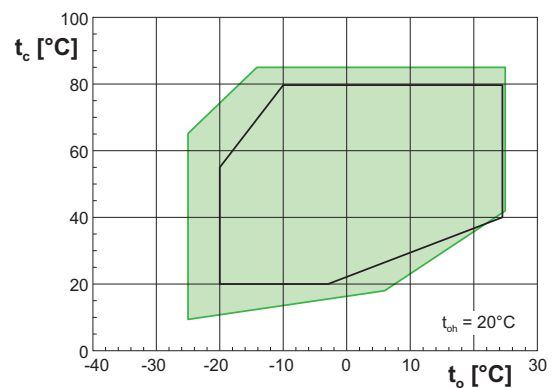
The ECOLINE series has now been extended to all models and the optimisation package has been developed further for universal use with different refrigerants – at the same time extending the operating ranges. The refrigerants include: R134a, R404A, R407A, R407C, R407F, R507A, R22, R290 and R1270.

The compressors are already designed for operation with "Low-GWP" HFO refrigerants and HFO-/HFC blends.

R404A AND R507A



R134a



WIDE RANGE OF APPLICATIONS

A comparison of ECOLINE application limits (green) with competitors (black) shows the remarkably wide application range of the ECOLINE series.

The application range of the ECOLINE series is also larger when compared with the respective predecessor compressors:

// R404A and R507A with motor version 2:
extended to $t_c = 62^\circ\text{C}$ and $t_o = 0^\circ\text{C}$

A fan is not required to provide additional cooling over the entire range of application.

// The universal refrigeration compressor with motor version 2 for medium and low temperature refrigeration is also suitable for modern systems, for example, with strongly reduced condensing temperature at low ambient temperatures and increased evaporation temperature.

By extending the condensing temperature to 62°C , the ECOLINE series can also be used in tropical and sub-tropical climate zones.

R134a with motor version 1:
application range extended to $t_c = 85^\circ\text{C}$

Variety of refrigerants

The compressors of the ECOLINE series are suitable for operation with a large refrigerant selection:

// R134a

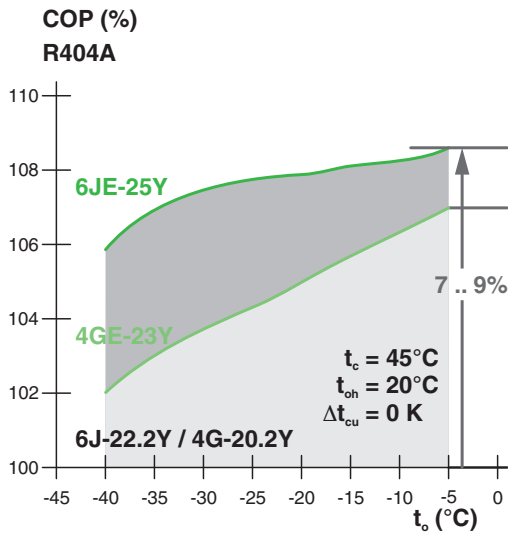
// R404A and R507A

// R407A, R407C, R407F and R22

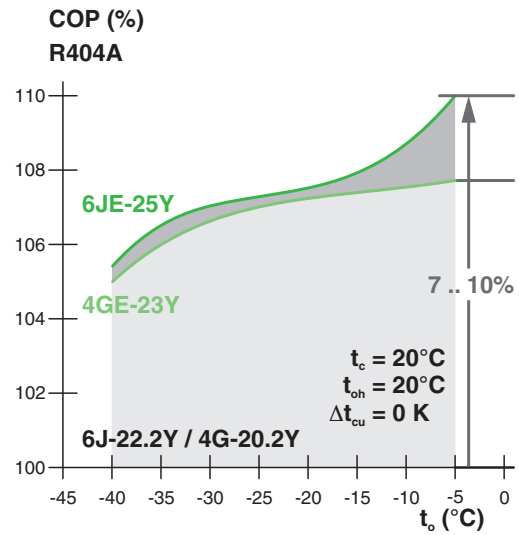
// R290 and R1270

// HFO and HFO/HFC blends

SUMMER



WINTER



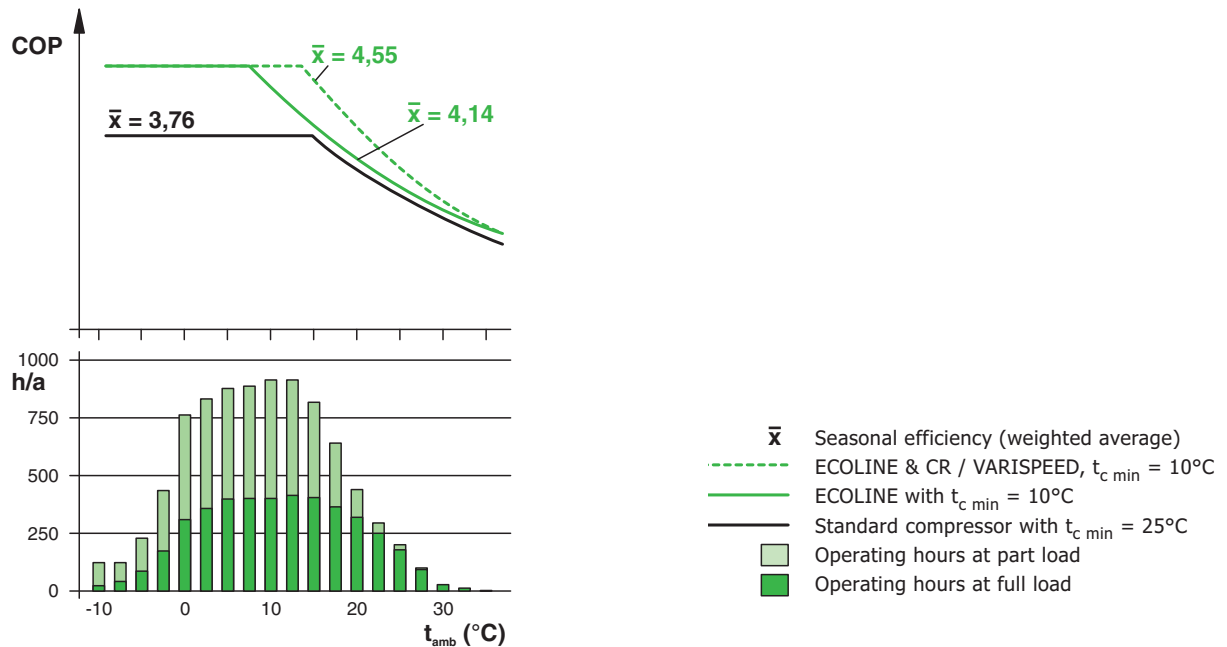
COMPRESSOR EFFICIENCY

The coefficient of performance (COP) of the new ECOLINE models has been improved by an average of 6% up to a maximum of 12% compared with preceding series.

This is not achieved with a single component, but by optimising the valve plates, reducing flow losses and discharge gas pulsation as well as specially adapted highly efficient motors with broad band characteristics.

All with BITZER's well known smooth operation and real backward compatibility.

SEASONAL EFFICIENCY AND TEMPERATURE DISTRIBUTION



SYSTEM EFFICIENCY

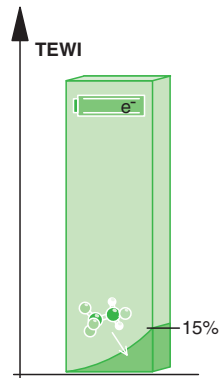
Modern refrigeration systems require compressors with flexible capacity adaptation. Via high part load efficiency these modern systems achieve excellent seasonal efficiency.



BITZER offers proven capacity control systems for the entire ECOLINE series as optional accessories:

// The CR system for 4- and 6-cylinder compressors (fast cycling blocked suction of all cylinder banks).

// The ECOLINE VARISPEED variant (with integrated frequency inverter).

All ECOLINE compressors are designed for operation with an external frequency inverter up to 70 Hz.



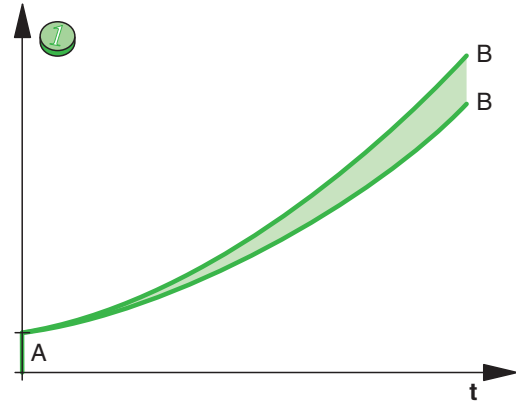
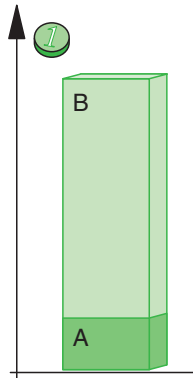
-  CO₂ energy equivalent = indirect share of TEWI
-  Refrigerant losses = direct share of TEWI


ENVIRONMENTAL IMPACT (TEWI)

The environmental impact of a refrigeration system can, amongst others, be represented by the Total Equivalent Warming Impact (TEWI).

Typical TEWI balances for supermarkets show that energy consumption contributes most to the total greenhouse impact. This indirect greenhouse effect – CO₂ emission as a result of power generation – can amount to over 90%.

The eco-balance can therefore best be improved by better efficiency.



 Life cycle costs of refrigeration system

 Capital expenditure costs

 Energy consumption and maintenance

LIFE CYCLE COSTS

The picture is similar for the total costs of a supermarket system (life cycle costs). The largest part results from many years of operation – 80% and more, depending on the system and its operation.

High compressor efficiency pays back for users.

High part load efficiency due to wide application range and capacity control of the compressors can reduce overall costs even more.

CE1	C1	CE2	C2	CE3	C3	CE4	C4	BE5	B5	BE6	B6	CE8	C8
2KES-05	2KC-05.2	2EES-3	2EC-3.2	4FES-5	4FC-5.2	4VES-10	4VCS-10.2	4JE-22	4J-22.2	6JE-33	6J-33.2	8GE-60	8GC-60.2
2KES-05	2KC-05.2	2EES-2	2EC-2.2	4FES-3	4FC-3.2	4VES-7	4VCS-6.2	4JE-15	4J-13.2	6JE-25	6J-22.2	8GE-50	8GC-50.2
						4VES-6		4JE-13		6JE-22			
2JES-07	2JC-07.2	2DES-3	2DC-3.2	4EES-6	4EC-6.2	4TES-12	4TCS-12.2	4HE-25	4H-25.2	6HE-35	6H-35.2	8FE-70	8FC-70.2
2JES-07	2JC-07.2	2DEC-2	2DC-2.2	4EES-4	4EC-4.2	4TES-9	4TCS-8.2	4HE-18	4H-15.2	6HE-28	6H-25.2	8FE-60	8FC-60.2
						4TES-8		4HE-15		6HE-25			
2HES-2	2HC-2.2	2CES-4	2CC-4.2	4DES-7	4DC-7.2	4PES-15	4PCS-15.2	4GE-30	4G-30.2	6GE-40	6G-40.2		
2HES-1	2HC-1.2	2CES-3	2CC-3.2	4DES-5	4DC-5.2	4PES-12	4PCS-10.2	4GE-23	4G-20.2	6GE-34	6G-30.2		
						4PES-10		4GE-20		6GE-30			
2GES-2	2GC-2.2			4CES-9	4CC-9.2	4NES-20	4NCS-20.2	4FE-35		6FE-50	6F-50.2		
2GES-2	2GC-2.2			4CES-6	4CC-6.2	4NES-14	4NCS-12.2	4FE-28		6FE-44	6F-40.2		
						4NES-12		4FE-25		6FE-40			
2FES-3	2FC-3.2											Motor 1	Motor 1
2FES-2	2FC-2.2											Motor 2	Motor 2
												Motor 3	

ECOLINE – BACKWARD COMPATIBILITY

The newly designed ECOLINE (shown in green) covers the entire portfolio of semi-hermetic BITZER reciprocating compressors. This includes both the OCTAGON series and the compressors of the .2 generation.

Each ECOLINE is compatible with its predecessor compressor. These predecessor compressors can be substituted without the need for modifying the system.

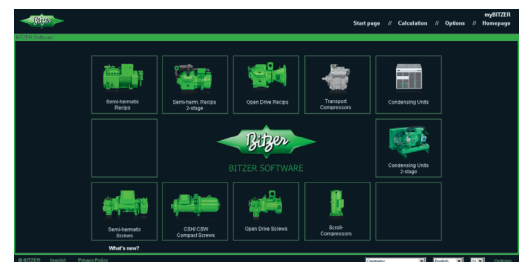
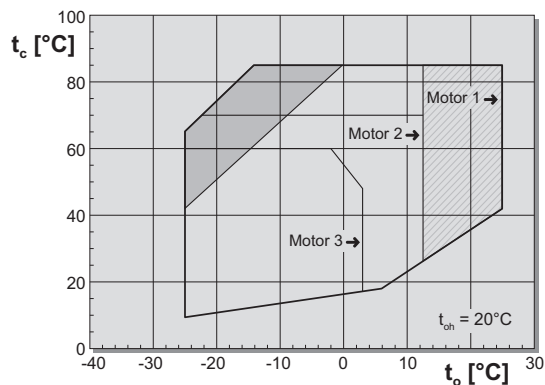
Whereas many of the major internal components have been redesigned, the outer shape has remained virtually unchanged: the same outer dimensions, unchanged mounting points, valve and sensor positions, connections for oil and gas equalisation, as well as for oil level regulators.

Only few details give an inkling of the new design inside the compressor:

- // The cylinder heads are somewhat higher.
- // For further details see KP-104.

Motor version 2 covers the classic refrigeration applications – medium and low temperature refrigeration – with one single product. In many cases it can thus replace a predecessor compressor with motor version 1.

R134a



MOTOR VERSION 3 FOR R134a

For supermarket applications with R134a, a version with specially adapted motor is available for the ECOLINE models CE4, BE5 and BE6 – motor version 3 – in addition to motor version 2.

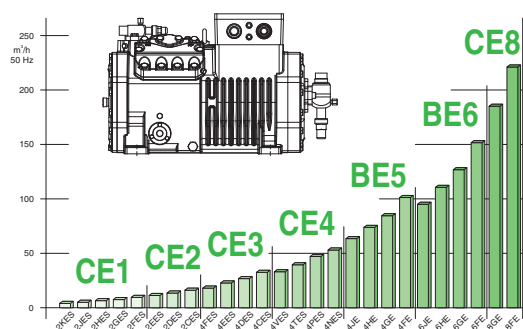
Motor version 3 has been specially designed for the pressure levels of R134a and focuses on applications in the medium temperature refrigeration range in modern systems.

For compressors with motor version 3, the standard motor can be operated with a frequency inverter up to 70 Hz (for mains voltage 400V/3/50Hz).

BITZER SOFTWARE

BITZER Software is available as web application, as CD-ROM or as download. It offers a comprehensive selection of compressors with the option of entering individual values. The resulting output data include all important performance parameters for compressors and auxiliary components, application limits, technical data and dimensional drawings. Furthermore, specific data sheets and coefficients for standard polynomials can be generated. These can either be printed out or used as file for spreadsheet programs.

The data of all ECOLINE compressors as well as their predecessor models are available in the BITZER Software.



ECOLINE SINGLE COMPRESSORS

Single compressors are the basis of the ECOLINE series. Motor version 2 covers the classic refrigeration applications – medium and low temperature refrigeration – with one single product.

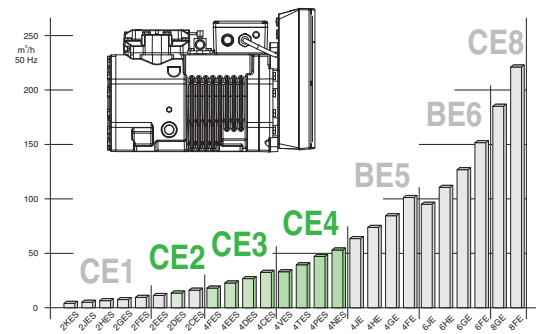
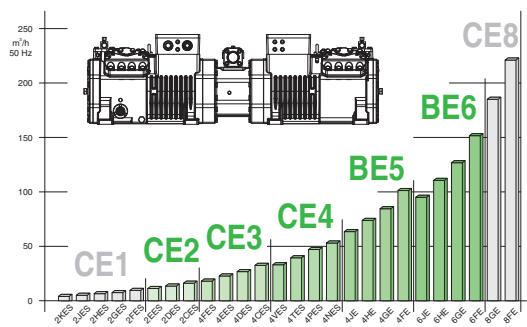
The ECOLINE compressors are suitable for a large number of refrigerants, whereby motor version 3 is specially designed for use with R134a.

Variable speed operation with an external frequency inverter: All ECOLINE compressors are designed for operation between 30 and 70 Hz – CE3 to BE6 can go down to 25 Hz.

For further information see brochure KP-104.



Displacements from 4.06 to 221 m³/h (50 Hz)



ECOLINE TANDEM S

Tandem compressors are the simplest and safest form of parallel operation of two compressors. The two crankcases are connected via a large-volume suction chamber. Oil and gas equalisation therefore works automatically.

Performance steps are easy controlled:

- // 100% or 50% via single compressor on / off.
- // Virtually stepless performance adjustment for 4- and 6-cylinder models, which are fitted completely with the new CR system: 100% down to ~5%.

For further information see brochure KP-114.



ECOLINE VARISPEED

Single compressors with integrated suction gas cooled frequency inverter (FI). Due to the large range control, the VARISPEED compressors are suitable for systems with major load variations or as lead compressor in racks.

Easy to commission due to completely parameterised FI.

Infinite capacity control:

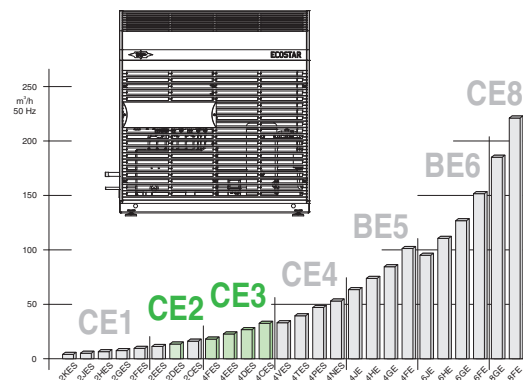
- // 2-cylinder models between 30 and 87 Hz
- // 4-cylinder models between 25 and 87 Hz

For further information see brochure KP-102.



Displacements from 22.7 to 303 m³/h (50 Hz)

Displacements from 23.7 to 99.2 m³/h (87 Hz)



ECOSTAR

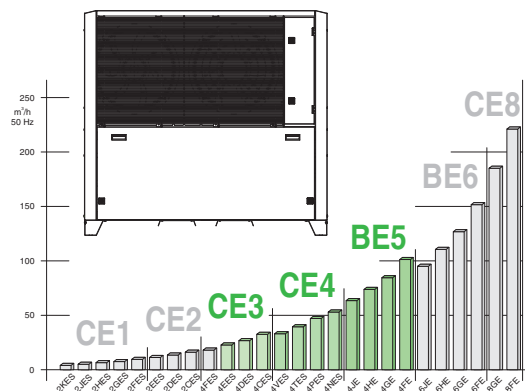
These air-cooled condensing units incorporate ECOLINE VARISPEED compressors. They are especially suitable for systems with heavily varying cooling loads or if several evaporators are planned for the system.

The integrated software allows for fast commissioning of the entire system. It offers a choice of operating modes, stores the operating data (12 months data log) and allows remote diagnosis.

For further information see brochure KP-207.



Displacements from 23.7 to 57.4 m³/h (87 Hz)



BOX TYPE CONDENSING UNIT

These newly developed air-cooled condensing units already meet the presently discussed efficiency criteria of the upcoming Ecodesign directive for condensing units.

Robust unit with modern design for outdoor installation

Compact air-cooled microchannel condensers with speed-controllable fans (EC motor)

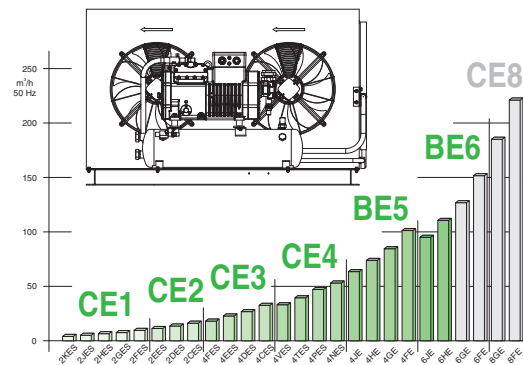
Low sound emissions due to encapsulated compressor section

Easy installation and fast commissioning

For further information see brochure KP-201.



Displacements from 22.7 to 101.8 m³/h (50 Hz)



AIR-COOLED CONDENSING UNITS

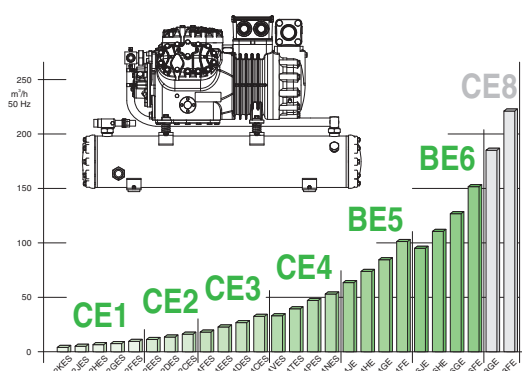
The air-cooled LH condensing units combine ECOLINE compressors with air-cooled condensers in matched performance sizes. With special accessory kits an individual equipment matching the demand is achieved.

Typical applications include display cabinets, refrigeration systems and freezers in bakeries and butcheries as well as discounters and smaller supermarkets.

For further information see brochure KP-200.



Displacements from 4.06 to 84.6 m³/h (50 Hz)



WATER-COOLED CONDENSING UNITS

Water-cooled condensing units are very compact. Same as for the air-cooled condensing units, the typical applications range from display cabinets and smaller systems with several cooling points to heat pumps.

Their use is always recommended when water is available as cost efficient coolant.

The entire portfolio is equipped with the proven BITZER shell and tube condensers, which are available in 2 variants: for cooling with fresh water and salt water.

For further information see brochure KP-220.



Displacements from 4.06 to 303 m³/h (50 Hz)



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