

Turbo technology boosts heat pumps and refrigeration technology

Compact turbo compressors for oil-free gas compression

Compact, robust compressors are essential for both heat pumps and refrigeration technology. With this in mind, ebm-papst developed the CompaNamic turbo compressor for the 1 kWe (electrical input power) to approx. 55 kWe motor power range, which allows variable flow quantities of different refrigerants while also requiring significantly less refrigerant due to a volume reduction of up to 90% in the compressor.

High level of efficiency and long service life

The 3 kWe and 10 kWe variants are particularly suitable for use with refrigerants R290 and R1234ze(E) and are therefore ideal for heat pumps and refrigeration technology, for example in larger buildings and industrial applications. Neither of the HighSpeed compressors uses oil lubrication, which offers further advantages: As there is no surface wetting with lubricant (oil including additives), heat transfer in the heat exchangers is improved and pressure losses are reduced. The use of suitable materials and hard coatings on the bearing surfaces ensure that the rotor starts and comes to a stop with practically no wear. The compressors are designed for a service life of approx. 150,000 hours and more than a million start-stop cycles.

Powerful compact motor

Despite their low torque, the compact, high-speed internal rotor motors produce 3 kWe at approx. 240,000 rpm and larger variants up to 55 kWe at approx. 60,000 rpm. The power electronics are designed for these operating conditions and can use a wide range of power supply voltages. For example, line voltages from approx. 180 to 240 VAC or 320 to 480 VAC are possible. For closed-loop control in pulse width or pulse amplitude modulation, the high speed of the internal rotor motors requires currents with frequencies of up to over 100 kHz, which the power output stages reliably provide with an efficiency of more than 97%, even at partial load. This results in economically efficient turbo compressors that compress both conventional as well as particularly environmentally friendly and natural refrigerants with no global warming potential. Their high efficiency and low operating noise levels are gentle on the environment and vibration-free operation prevents structure-borne noise transmission. This makes the new CompaNamic compressors suitable for demanding applications with stringent requirements for smooth operation, reliability and ease of use.

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Fig. 1: ebm-papst develops turbo compressors in the 1 kWe to approx. 55 kWe electrical power range that allow variable flow quantities of various refrigerants and use significantly less refrigerant by reducing the internal volume by 90% (example: P2 compressor).

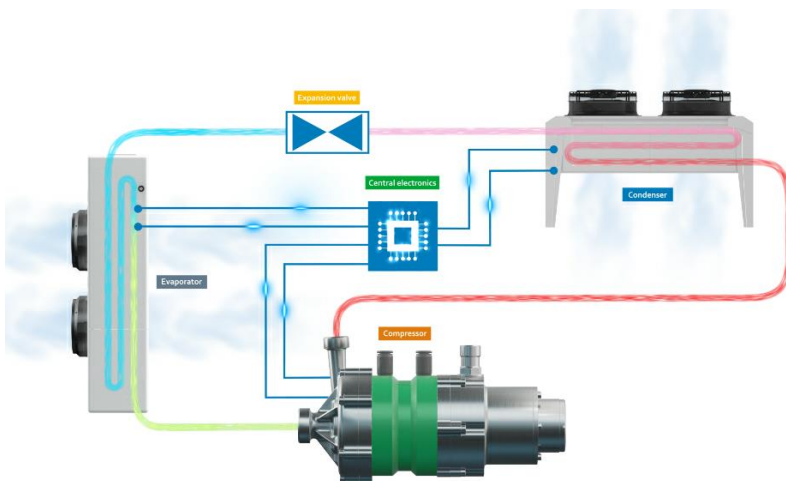


Image 2: Ideally, the compressor operates without oil, which keeps the system clean, increases the efficiency of heat transfer and eliminates the need for auxiliary units such as oil separators and oil sumps, as well as the design work for the oil return system.

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Figures ebm-papst
Characters approx. 2,300, including headings and sub-headings
Tags HighSpeed, turbo compressors, refrigeration technology, heat pumps, oil-free
Link www.ebmpapst.com/highspeed

About ebm-papst

The ebm-papst Group, a family-run company headquartered in Mulfingen, Germany, is the world's leading manufacturer of fans and motors. Since it was founded in 1963, the technological leader has set international industry standards with its core competencies in motor technology, electronics, digitalization, and aerodynamics. ebm-papst offers sustainable, intelligent, and tailor-made solutions for virtually every requirement in ventilation and heating technology.

In the 2023/24 financial year, the Group generated turnover of EUR 2.408 billion. It employs just under 14,000 people at 30 production sites (including in Germany, China, and the U.S.) and in 50 sales offices worldwide. ebm-papst sets the benchmark in almost all sectors, such as ventilation, air conditioning and refrigeration technology, heating technology, information technology, mechanical engineering, intralogistics, and medical technology.

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