

Sulzer's HST™ and HSR high-speed turbocompressors for truly oil-free air

Today, we are increasingly concerned about the environment and sustainable development. Industries are looking for solutions that reduce both energy consumption and carbon footprint – and at the same time increase equipment efficiency and reliability. When it comes to the production of compressed air, all this can be achieved with Sulzer's centrifugal air turbocompressors driven by an electric motor. Sulzer's product range includes turbocompressors for both low-pressure industrial applications (HST) and industrial compressed air supply networks (HSR).

The new generation HST and HSR turbocompressors comprise high-speed technology that provides excellent efficiency in a wide operating range and with sufficient margins to all technical limits, such as stresses, critical speed and maximum temperatures. The operating costs of a turbocompressor are lower than those of a conventional positive displacement blower. As a matter of fact, the HST and HSR compressors are nearly maintenance-free – only the filters need to be replaced.

One clear advantage of Sulzer's high-speed compressors is their low lifetime cost. Although the equipment investment is slightly higher than for similar products on the market, the compressor has a short payback time due to low energy and maintenance costs. The magnetic bearings bring the advantage of no mechanical friction and no mechanical wear,

and this allows a very long time between overhauls. These machines are excellent examples of future products that follow the principle of circular economy.

Another benefit of a high-speed compressor is its safety. Because the unit does not contain a single drop of oil, the air entering the process is free of any impurities that could cause problems with the quality of the product being manufactured or the sensitive equipment of the plant. Another very important aspect is that clean air, free from oil residues, does not cause any health problems.

The silent HST turbocompressor features an advanced design with proven magnetic bearing technology and a high-speed motor driven through a built-in frequency converter. The impeller of the radial compressor, the electric motor and the cooling fan are integrated into one common shaft, which runs at a high speed. A variable frequency drive generates the required high-supply frequency, and the bearing challenge is solved by using contactless active magnetic bearings (AMB). In addition to low friction losses, AMB allows for a totally oil-free design. In AMB, the rotating part levitates using actively-controlled electromagnets. The system is high-tech but simple from the end user's point of view. A distinguishing feature of the HST is the fact that it is cooled by air only.

The most common application for the HST is the aeration of wastewater treatment tanks where the biological process decomposes the impurities in the water. The HST is suitable both for municipal and industrial wastewater treatment but can also be used in industrial processes that need low-pressure compressed air of up to 1 bar (gauge). Read more about the HST turbocompressor on [sulzer.com](https://www.sulzer.com).



The HSR turbocompressor has been well received in process industries, like pulp and paper, food and beverage – applications where completely clean medium-pressure and low-pressure process air is an absolute requirement. Due to its high adjustability and superior features, the compressor is also used in, for example, electronics manufacturing. Additional applications are constantly emerging. The HSR is also suitable for providing oil-free compressed air to the process in the chemical processing, pharmaceutical and medical industries as well as in textile manufacturing.

The technology in the HSR is similar to that of the HST, but where the HST makes do with a single-stage air end, the HSR utilizes two-stage or three-stage compression for maximum pressures of 4.5 and 9 bar (gauge) respectively. The compression is done with liquid-cooled turbo air ends, directly driven by a liquid-cooled high-speed permanent magnet motor. For reaching the necessary speed and for flow control – similarly to the HST – the HSR uses one or two variable frequency drives to control the motor(s). The wide flow range can be further extended by applying adjustable diffuser vanes. By utilizing proportional blow-off valves, the flow can be adjusted between 0 and 100%. The oil-free HSR compressor range offers truly outstanding wire-to-air efficiency. Find out more about the HSR on sulzer.com.

Please feel free to contact Sulzer's local sales representative for more information.

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White paper:

[“Centrifugal compressor efficiency improvement and its environmental impact”](#) by Edward Paro, Business Development Manager Aeration, Sulzer Pumps Finland Oy, Kotka, Finland

Case studies:

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[Sulzer turbocompressors boost overall efficiency of wastewater treatment in a paper mill](#)

