

Heat Recovery Systems
PTG, SWT Series

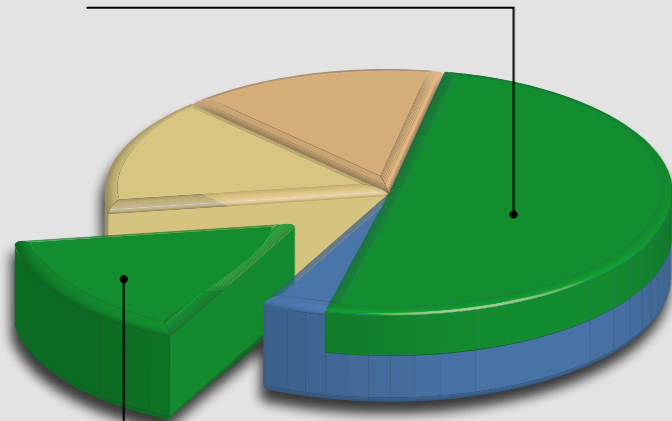


Why recover heat?

The question should in fact be: Why not recover heat? Amazingly, almost 100 percent of the electrical energy input to a compressor is turned into heat. Approximately 2 percent of this energy radiates away from the compressor package into the ambient surroundings and 2 percent remains in the compressed air. This means that with installation of heat recovery systems from KAESER KOMPRESSOREN up to 96 % of the energy dedicated to compressed air production can be recovered and reused. Therefore, in view of continuously soaring energy prices and concerns regarding the environment, the potential benefits and savings are enormous.

Benefit the environment and save costs with heat recovery

Potential energy cost savings through heat recovery



Energy cost savings through system optimisation

- Compressed air system investment
- Energy costs
- Maintenance costs
- Potential energy cost savings

If we examine the total costs (life cycle costs) of a compressed air system, we see that energy accounts for the lion's share. In fact energy costs still make up at least 70 percent of total costs even for optimised systems. However, a considerable proportion of these costs can be saved by using recyclable heat from the compressor via heat recovery. This not only benefits a company's annual operational budget to the tune of thousands of Euro per year, but also reduces the impact on the environment through a multi-ton reduction in CO₂ emissions.

Heat recovery



For plate heat exchanger systems	Compressor size		
	"Small"	"Medium"	"Large"
Compressor model	SM 15	BSD 81	FSD 471
Rated power	9 kW	45 kW	250 kW
Annual saving potential with fuel oil	€ 842	€ 5,530	€ 29,476
	3,826 kg CO ₂	25,135 kg CO ₂	133,969 kg CO ₂

► See pages 6 and 7 for details regarding calculation of savings potential.

► Turn to pages 6 and 7 to see how much you could save.



Significant savings in spite of rising energy prices

The trend for continuously rising fuel oil costs has had a knock-on effect on energy prices in general. However, you can counteract this tendency by equipping your compressor installations with high performance heat recovery systems.



Heating with warm air

Warmed compressor cooling air can be ducted away to provide highly effective space heating. With this method, up to 96% of the compressor's input energy can therefore be recovered as heat.



Feed heat energy to a heating system

Unbelievable as it may seem, in a fully encapsulated fluid-/oil-cooled rotary screw compressor package, up to 76% of the input energy for the compressor system can be recovered as heat. This drastically reduces the need for use of primary energy for heating purposes.



Heat recovery reduces costs and benefits the environment

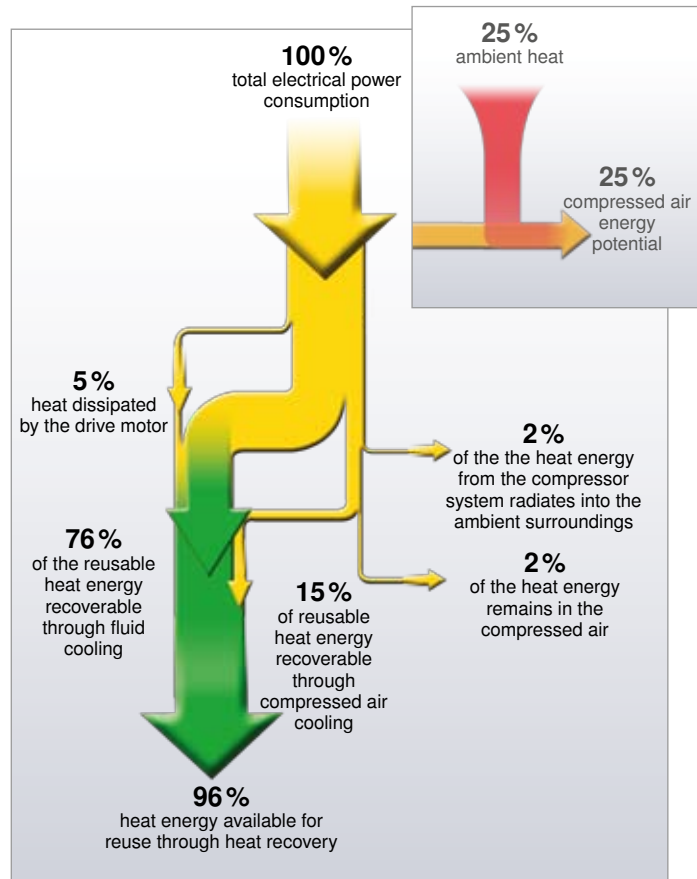
Up to 96 percent of the heat generated by a rotary screw compressor can be recovered as reusable energy. Every litre of fuel oil saved equates to a 2.727 kg reduction in CO₂ emissions, which is not only beneficial for the environment, but also results in significant cost savings. At today's energy prices, the amortisation period for a heat recovery system ranges between 6 months and 1 year (based on a plate heat exchanger feeding energy into a heating system). Warm air can also be recovered for use from older KAESER rotary screw compressors simply by installing additional ducting. We install optional fail-safe and plate heat exchangers for new rotary screw compressor systems (from 18.5 kW and up). For older rotary screw compressor installations we offer specially designed retro-fit kits.

Heat flow diagram

Amazingly, almost 100 percent of the electrical energy input to a compressor is converted into heat.

The adjacent **heat flow diagram (right)** shows how this energy is distributed throughout the compressor system and how it can be recovered:

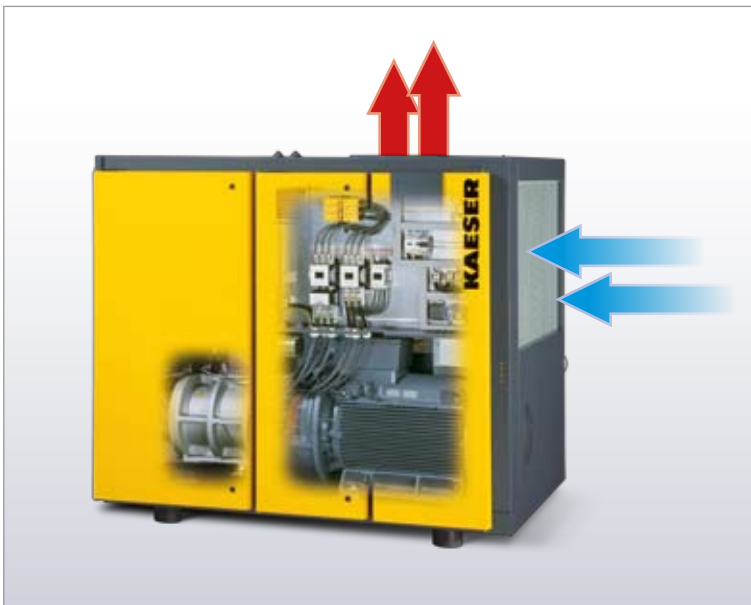
96 percent of the energy can be recovered for reuse, two percent remains in the compressed air and two percent radiates away from the compressor package into the ambient surroundings. So where does the usable energy in compressed air come from? The answer is actually quite simple and perhaps surprising: During the compression process and conversion of the electrical drive energy into heat, the compressor charges the air it draws in with energy potential. This corresponds to approximately 25 percent of the compressor's electrical power consumption. This energy is only usable however once the compressed air expands at its point of use and in so doing absorbs heat energy from the ambient surroundings. Of course the amount of this energy that is available for use depends on the pressure and leakage losses within the compressed air system.



Heat flow diagram

Appropriate cooling

The enclosed, compact design of modern rotary screw compressors makes them especially suitable for heat recovery. Direct use of the recyclable heat via a ducting system enables up to 96 % of the compressor's total energy requirement to be recovered and used for heating purposes. This is the case irrespective of whether fluid-injection cooled compressors or dry-running screw compressors are used.



Usable cooling air with a rotary screw compressor

Moreover, the feeding of recyclable compressor heat into hot water heating systems and industrial water systems is also well worthwhile: Over 70 percent of the installed compressor power can still be recovered for heating applications, and without the need for additional energy consumption.

Unlike fluid-cooled compressors however, dry-running rotary screw compressors must be primarily water-cooled in order to take advantage of this heat recovery method.

Heat exchanger systems

Hot water – up to 70 °C, or even 90 °C if required – for various purposes can be produced either via a PTG plate heat exchanger or a SWT fail-safe heat exchanger. PTG heat exchanger systems are used for conventional water heating applications, whilst SWT fail-safe heat exchangers are recommended for applications that have no other interconnecting water circuits and where it is essential that the water being warmed remains completely uncontaminated.

PTG plate heat exchanger

The cost-effective solution to enable utilisation of recyclable heat from rotary screw compressors.

Application:

- Feeding of heat into central heating systems
- Laundries
- Electroplating
- General process heat



Heat fed to heating system

SWT fail-safe heat exchanger

Fail-safe plate heat exchangers prevent the possibility of water and cooling fluids from mixing.

Application:

- Food processing industry
- Water heating
- Chemical and pharmaceutical industry
- Cafeterias and large scale catering establishments



Warm air heat recovery

When using recyclable heat for space heating, ducting simply feeds the warmed cooling air to where it is needed e.g. adjacent facilities, such as warehouses or workshops.

At warmer times of the year when heating is not required, a louver flap can be used to vent this warm air to the outside. Thermostatically controlled, motorised louvers are able to precisely maintain the temperature in a room by enabling partial or full flow of heating air.

Application:

- Auxiliary or main heating for warehouses or workshops
- To aid drying in painting and washing applications
- To create air curtains
- Improving efficiency of oil burners through the heating of combustion air



Ducting installation



Ducting for heating of adjacent rooms

KAESER – The world is our home

As one of the world's largest manufacturers of rotary screw compressors, KAESER KOMPRESSOREN is represented throughout the world by a comprehensive network of branches, subsidiary companies and authorised partners in over 90 countries.

With innovative products and services, KAESER KOMPRESSOREN's experienced consultants and engineers help customers to enhance their competitive edge by working in close partnership to develop progressive system concepts that continuously push the boundaries of performance and compressed air efficiency. Moreover, the decades of knowledge and expertise from this industry-leading system provider are made available to each and every customer via the Kaeser group's global computer network.

These advantages, coupled with KAESER's worldwide service organisation, ensure that all products operate at the peak of their performance at all times and provide maximum availability.

