KAESER COMPRESSORS®

Rotary Screw Compressors

CSD(X) Series

With the world-renowned **SIGMA PROFILE**

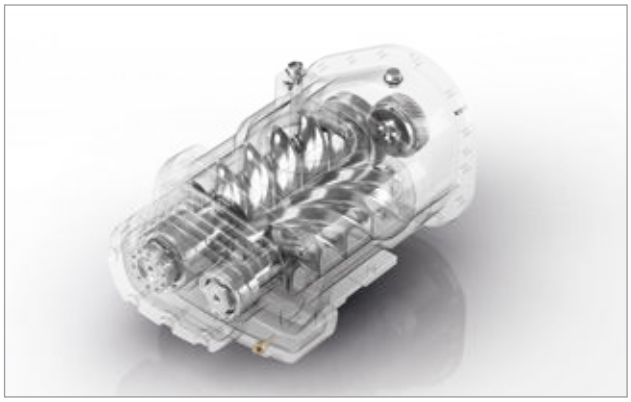
Flow rate 1.1 to 19.4 m³/min, Pressure 5.5 to 15 bar

www.kaeser.com

CSD / CSDX series

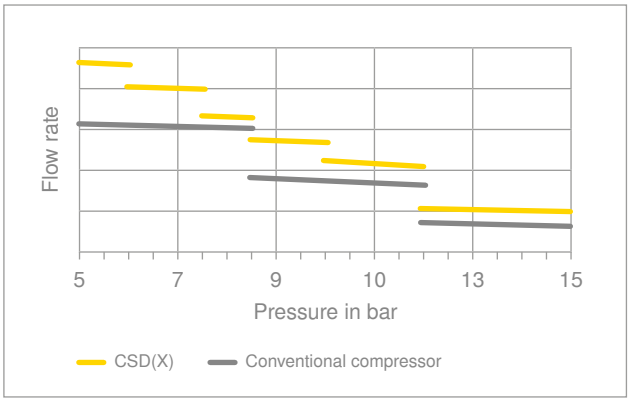
CSD(X) – Power converted into efficiency

Efficient, versatile and application-oriented, the new generation of CSD(X) series fluid-injected rotary screw compressors from KAESER delivers power even more precisely to the application at hand. Six pressure variants guarantee the perfect match for your individual pressure requirements, whilst delivering significantly enhanced levels of efficiency.
CSD(X) series rotary screw compressors are the perfect team players for high-efficiency industrial compressed air stations. The internal SIGMA CONTROL 2 compressor controller offers a multitude of communications channels, allowing seamless integration into master controllers such as the SIGMA AIR MANAGER 4.0, as well as in-house central control systems. This allows unprecedented levels of efficiency to be achieved. What's more, they also combine user- and maintenance-friendliness with exceptional versatility and environmentally responsible design.



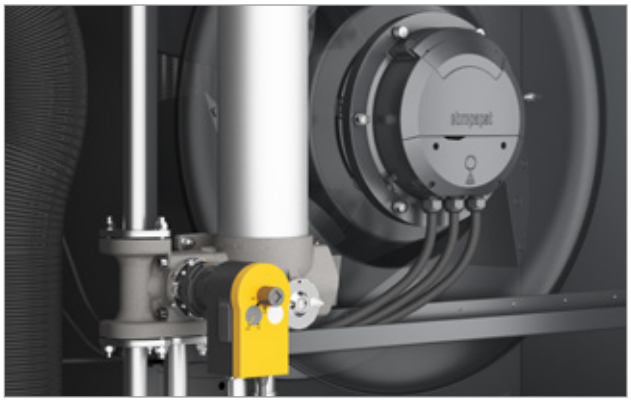
SIGMA PROFILE – Sustainable efficiency

Continuous optimisation of the SIGMA PROFILE rotors in the rotary screw airend produces a steady stream of constantly upgraded models with significantly improved energy efficiency, true to the KAESER motto of "More compressed air for less energy". Accordingly, the latest models boast an impressive reduction in energy consumption over previous models.



More compressed air variants – More compressed air

Fixed-speed versions of the latest-generation CSD(X) machines are offered in six different pressure variants, rather than the previous three. This enables even more precise adjustment to the pressure requirements of the respective application, resulting in a significant increase in compressed air flow rate.



Electronic Thermo Management (ETM)

Electronic Thermo Management (ETM) enables the SIGMA CONTROL 2 compressor controller to reliably prevent condensate formation. Thanks to the frequency-controlled fan unit, the SIGMA CONTROL 2 can also adjust the cooling air flow in accordance with ambient conditions. This means that fan speed can be reduced at low temperatures or during partial load operation, thereby consuming significantly less energy.

Image: Example compressed air station

Maximum drive efficiency

For even greater energy efficiency, KAESER always selects the most efficient drive possible. Fixed-speed systems are equipped with asynchronous motors, which meet the best possible efficiency class of IE4 for this type of drive. Frequency-controlled SFC systems use IE5 motors and also meet the requirements for IES2 system efficiency, thereby achieving the highest possible efficiency rating in accordance with the European standard IEC 61800-9.

CSD / CSDX series

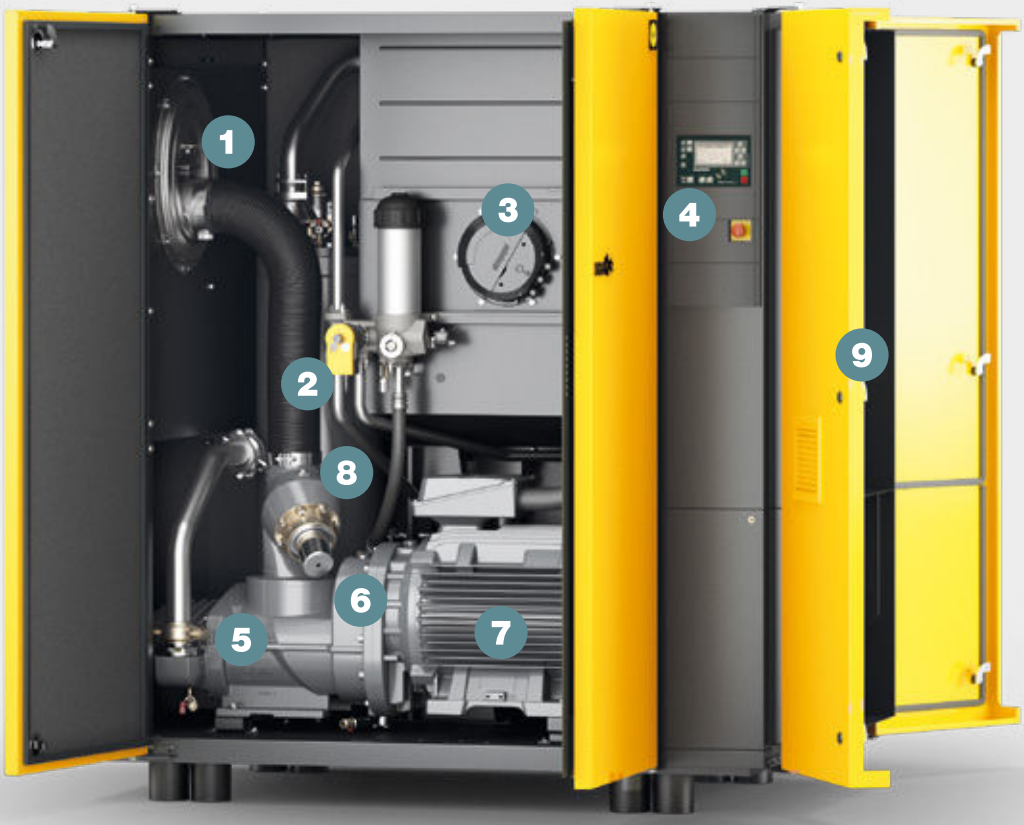
The highest quality in every detail

(1) Lower resistance

The generously dimensioned air filter features a large surface area, which allows more dust particles to be retained whilst simultaneously minimising pressure losses. To ensure continuous efficiency, the SIGMA CONTROL 2 monitors the condition of the filter via a vacuum switch.

(2) Reliable and efficient

The innovative Electronic Thermo Management (ETM) system dynamically controls fluid temperatures according to the prevailing operating conditions. This not only ensures reliable prevention of condensate accumulation, but also boosts energy efficiency.



MADE IN GERMANY

Image: CSD 130

(6) Power converted into efficiency

The integrated package consisting of motor, timing gears and airend permits the most energy-efficient airend speed to be selected for each operating point. The six pressure variants guarantee a precise match for your individual pressure requirements.

(7) Certified efficiency

By providing the best possible efficiency class for fixed-speed motors (IE4) and motors with frequency converter (IE5), KAESER targets maximum energy savings. To ensure reliable operation, the SIGMA CONTROL 2 can also monitor motor temperature via a Pt100 sensor, thereby extending the service life of the motor.

(8) Redesigned for greater efficiency

The new inlet valve has been optimised for the lowest possible pressure loss. Together with the larger inlet filter, it results in a reduced intake differential and therefore greater efficiency for the entire rotary screw compressor.

(3) Cooling air on demand

The frequency-controlled fan only delivers as much cooling air as the compressor mode and ambient conditions require. This translates into lower energy consumption and a significantly reduced CO_2 footprint.

(4) SIGMA CONTROL 2: Optimum efficiency

The internal SIGMA CONTROL 2 compressor controller ensures efficient control, monitoring and documentation of compressor operation at all times. Variable interfaces enable seamless networking capability, whilst the SD card slot makes updates quick and easy.

(5) Save with the SIGMA PROFILE

At the heart of every CSD(X) system lies a premium-quality airend featuring the continuously refined and optimised SIGMA PROFILE. Flow-optimised and robustly constructed, this combines maximum energy efficiency with sustainable durability.

Image: CSD 130

(9) Compact and user-friendly

The split control cabinet doors ensure optimum accessibility and a reduced overall footprint.

(10) Effective cooling

Because the cooling air flows through them first, the external coolers minimise the compressed air discharge temperature. This delivers significant savings when it comes to compressed air treatment. Furthermore, it makes the coolers easier to inspect and clean.

(11) Simple fluid changes

In order to make fluid changes as simple as possible, all relevant connections are attached to the oil separator tank. Even faster servicing from the rear side of the CSD(X) reduces downtime to an absolute minimum.

CSD T / CSDX T series

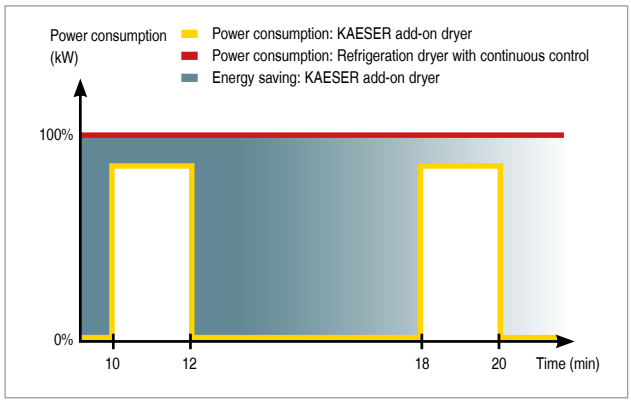
Premium compressed air quality with add-on dryer

KAESER add-on dryers reliably protect the compressed air network against pipe corrosion, equipment failure and product damage. These dryers impress with their durable construction, exceptionally low energy consumption and high-quality features such as the ECO-DRAIN condensate drain, whilst their compact design permits a minimum 22% reduction in refrigerant charge and therefore of the CO_2 equivalent.

In comparison with separate refrigeration dryers, add-on dryers require significantly less space and are simpler to install, thanks to the integrated piping between compressor and dryer.

Not sure which solution is the best for your requirements?

Your KAESER contact partner will be glad to assist you!



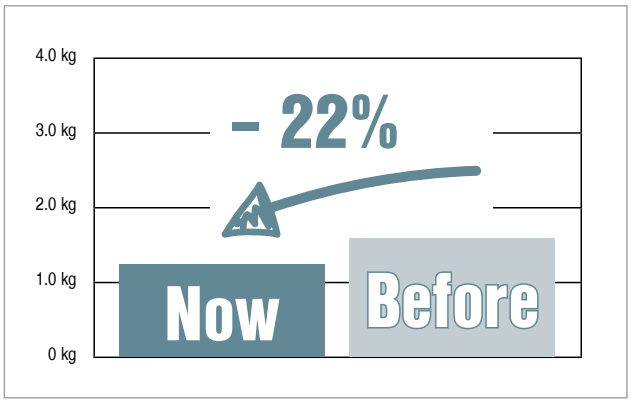
Energy-saving control

The integrated refrigeration dryer in CSD(X) T systems provides highly efficient performance thanks to its energy-saving control. It only operates when compressed air is actually flowing through the dryer; as a result, the required compressed air quality is achieved with maximum energy efficiency.

Optimum accessibility

The add-on dryer is equipped with a door for easy service access, thereby simplifying maintenance work and minimising the associated downtime.

Image: CSDX 145 T



Future-proof refrigerant

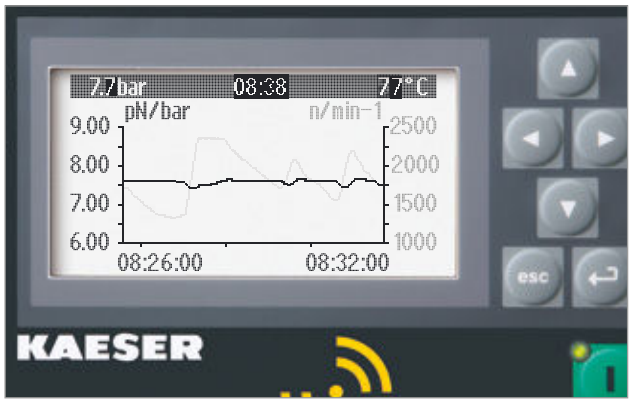
The new F-Gas Regulation EU 517/2014 is intended to minimise emissions of fluorinated greenhouse gases and therefore contribute to limiting global warming. KAESER's new T-systems operate using R-513A refrigerant, which benefits from a very low GWP (Global Warming Potential). This means that they will remain future-proof throughout their entire life cycle.

Reduced refrigerant volumes

The refrigeration dryers in KAESER's new CSD(X) T systems require approximately 22% (CSDX) and 26% (CSD) less refrigerant respectively than previous models. This not only saves costs, but is also significantly more environmentally sustainable.

Your benefits at a glance

- Best motor efficiency class IE5
- Best system efficiency class IES2
- Durable and service-friendly drive
- Minimal operating costs, high productivity and availability
- EMC-certified complete system



Constant pressure

Flow rate can be adjusted within the control range, according to pressure. Working pressure is kept constant to within ±0.1 bar. This allows the maximum pressure to be reduced, thereby saving energy and therefore costs.

EMC-certified complete system

It goes without saying that the SFC control cabinet and SIGMA CONTROL 2 controller are tested and certified both as individual components and as a complete system to EMC directive EN 55011 for Class A1 industrial power supplies.

CSD (T) SFC / CSDX (T) SFC series

Frequency-controlled compressor for efficient peak load operation

Maximum flexibility and sustainability: thanks to their variable-speed drive motors, peak load compressors from KAESER always deliver the exact volume of compressed air actually required. This makes them particularly efficient in applications with variable air demand.

Committed to meeting your objectives

Peak load compressors stand out for their extremely high levels of flexibility when it comes to delivery volumes, guaranteeing a high level of compressor efficiency across the whole delivery range.

Ultra-efficient – IE5

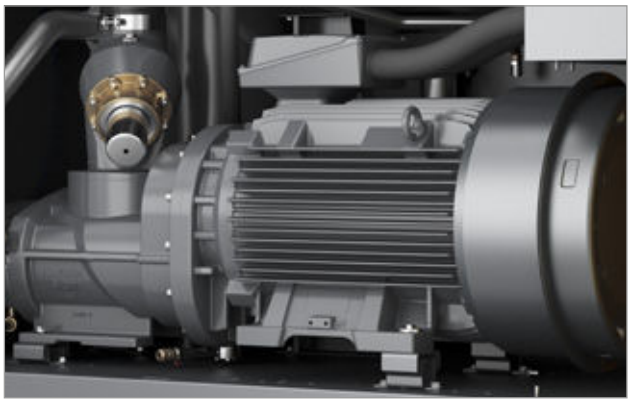
Frequency-controlled motors from the CSD SFC and CSDX SFC are designed for operation with a frequency converter. This enables them to achieve the highest possible efficiency class of IE5 (“Ultra Premium Efficiency”) under IEC 60034-30-2.

Perfect teamwork – IES2

In the case of compressors with variable speed control, motor and frequency converter must work together in harmony in order to operate efficiently. KAESER selects motors with optimally matched frequency converters in order to guarantee perfect interplay for the highest level of system efficiency – IES2.

Durable and service-friendly: Synchronous reluctance motor

The rotor in the synchronous reluctance motor does not contain aluminium, copper or rare earth materials. The functional principle keeps heat losses in the rotor to a minimum, which results in significantly lower bearing temperatures and therefore increased service life.



Compact powerhouse: Permanent magnet motor

The permanent magnet motor (CSDX 200 SFC models only) was developed in close collaboration with Siemens. This compact powerhouse impresses with its low reactive current losses and highest possible efficiency.

SIGMA CONTROL 2 internal compressor controller

SIGMA CONTROL 2

The integrated SIGMA CONTROL 2 compressor controller coordinates compressed air generation and ensures efficient, reliable machine operation. It also ensures perfect interplay when operating as part of a network. All relevant components and operating states are monitored and evaluated – messages are available to the operator for evaluation directly on the controller display, or, thanks to the integrated web server, simply and conveniently from any desk with a PC. A multitude of communications functions are available, including the option of connecting the machine to a SCADA central control system, meaning that you can stay connected in any eventuality.

Intelligent and adaptable

Superior efficiency thanks to integrated functionality. Two machines can be connected with one another in cost-efficient Master/Slave operation. When it comes to add-on dryers, the energy-saving control ensures perfect adaptation to your requirements. Optimum networking is simple and intuitive with the SAM 4.0 master compressed air management system and guaranteed via the secure KAESER SIGMA NETWORK.

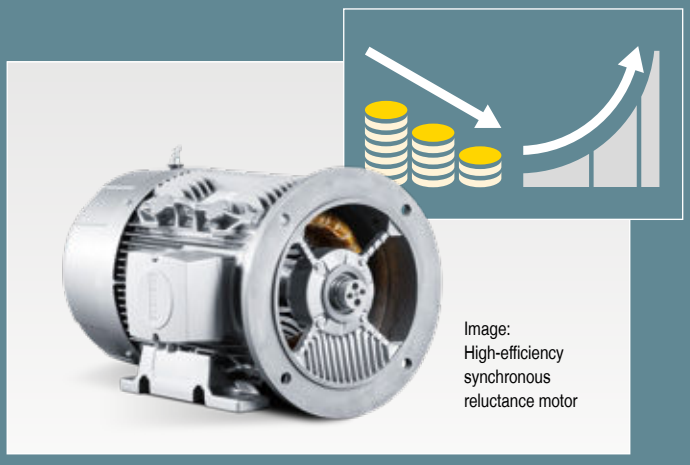


Image:
High-efficiency synchronous reluctance motor

The essence of efficiency

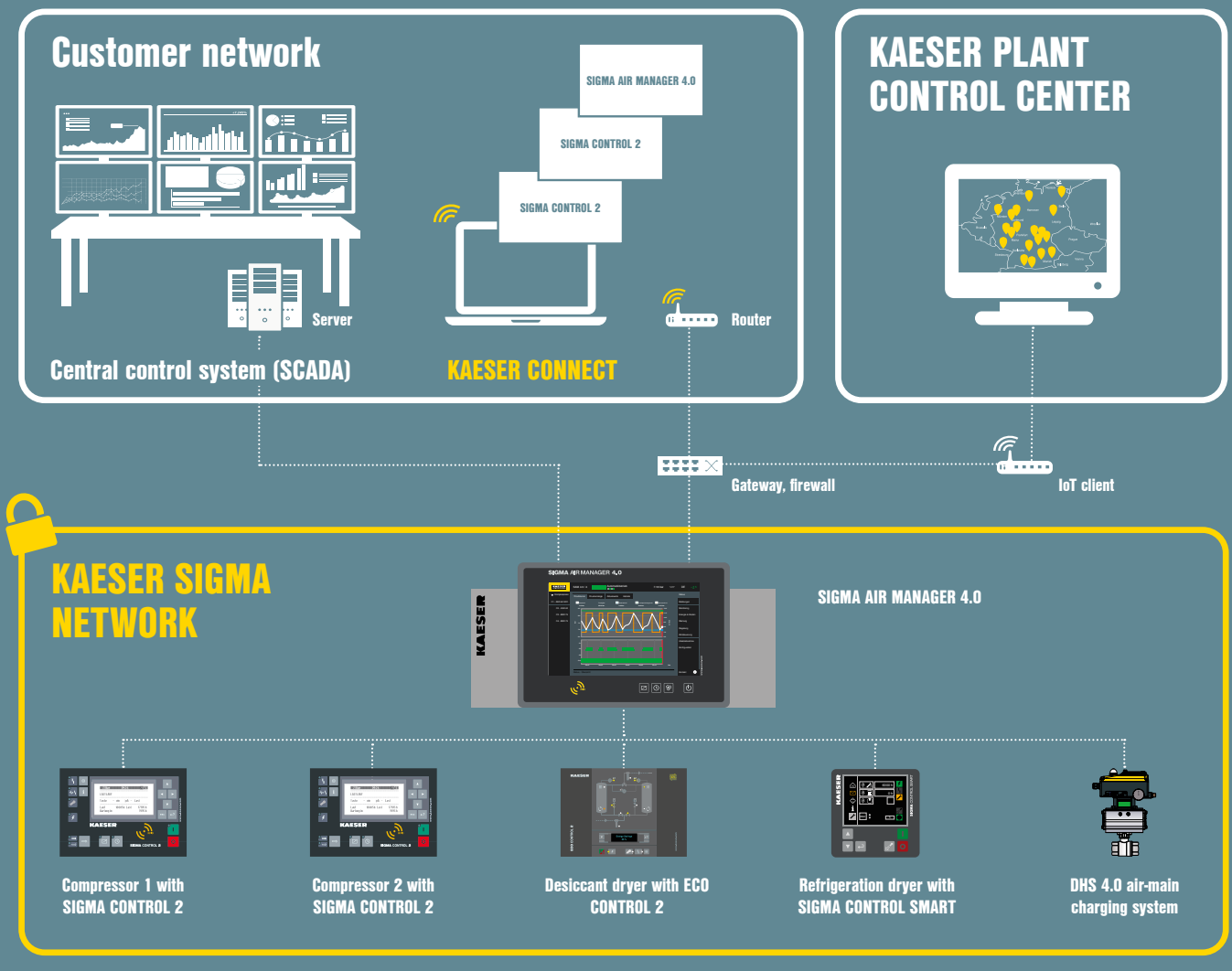
The SIGMA CONTROL 2 controller's numerous sensors and actuators work together perfectly. The innovative Electronic Thermo Management (ETM) dynamically controls fluid temperatures in the system. Air intake and compressor temperatures are monitored so that the electronically operated thermostatic control valve integrated into the refrigerant circuit can be activated when necessary. This also enables the operator to better adapt the heat recovery system to suit their specific needs.

A perfect fit with any drive type

Whether operating in the intelligent Dynamic mode, where the motor windings temperature must be monitored at idle, or in conjunction with a frequency converter and a synchronous reluctance motor, the SIGMA CONTROL 2 demonstrates its quality and guarantees efficient operation in all circumstances.

SIGMA AIR MANAGER 4.0

Adaptive, efficient and networked – demand-oriented compressed air management takes on a whole new meaning with the SIGMA AIR MANAGER 4.0. This advanced master controller coordinates operation of multiple compressors, as well as dryers or filters, with exceptional efficiency. A patented, simulation-based optimisation process predictively determines future demand based on recorded, past compressed air consumption profiles. Thanks to networking of all components in the compressed air station via this intelligent master controller and the secure KAESER SIGMA NETWORK, comprehensive monitoring, energy management and predictive maintenance are all possible.



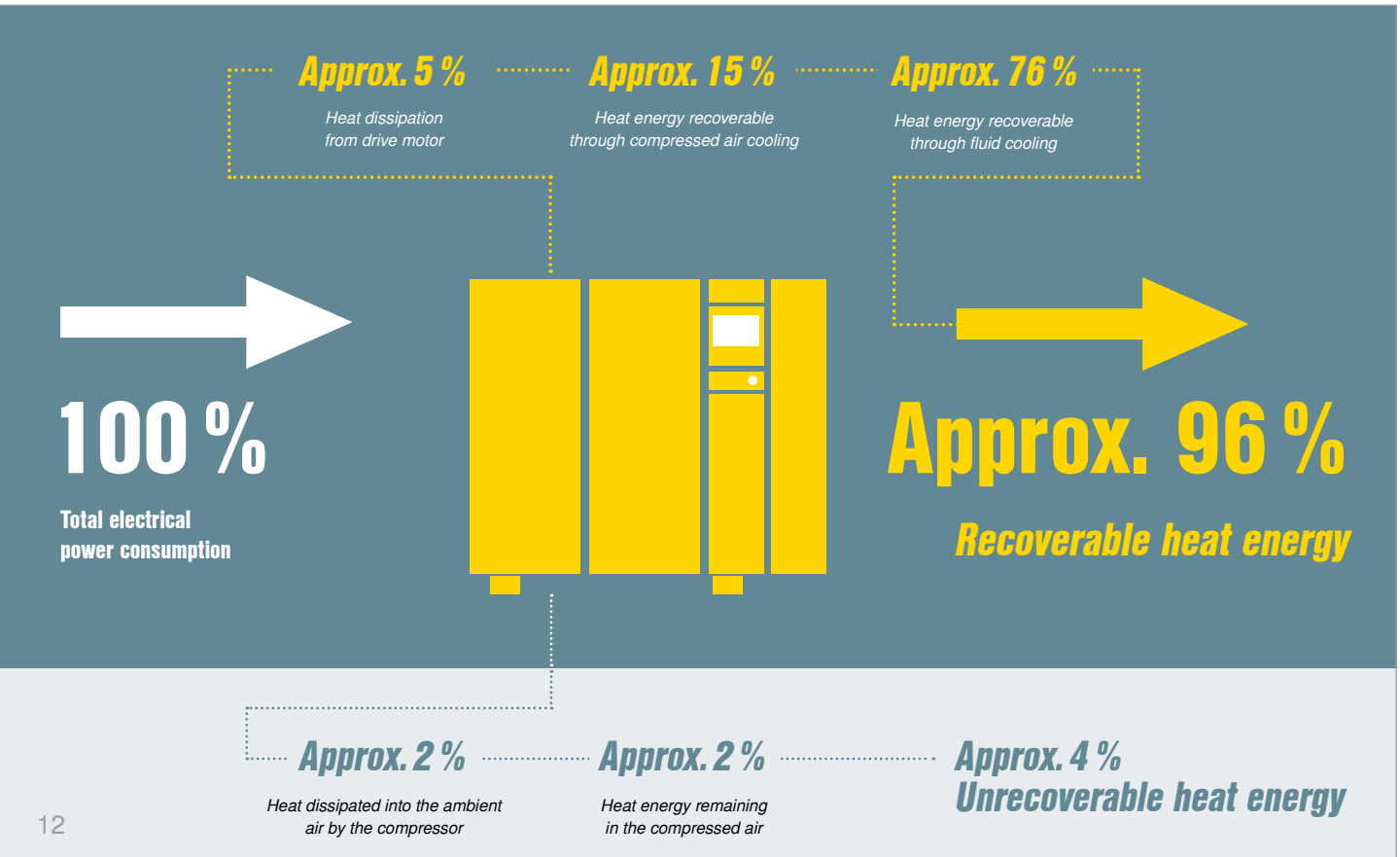
Heat recovery – Energy from compression

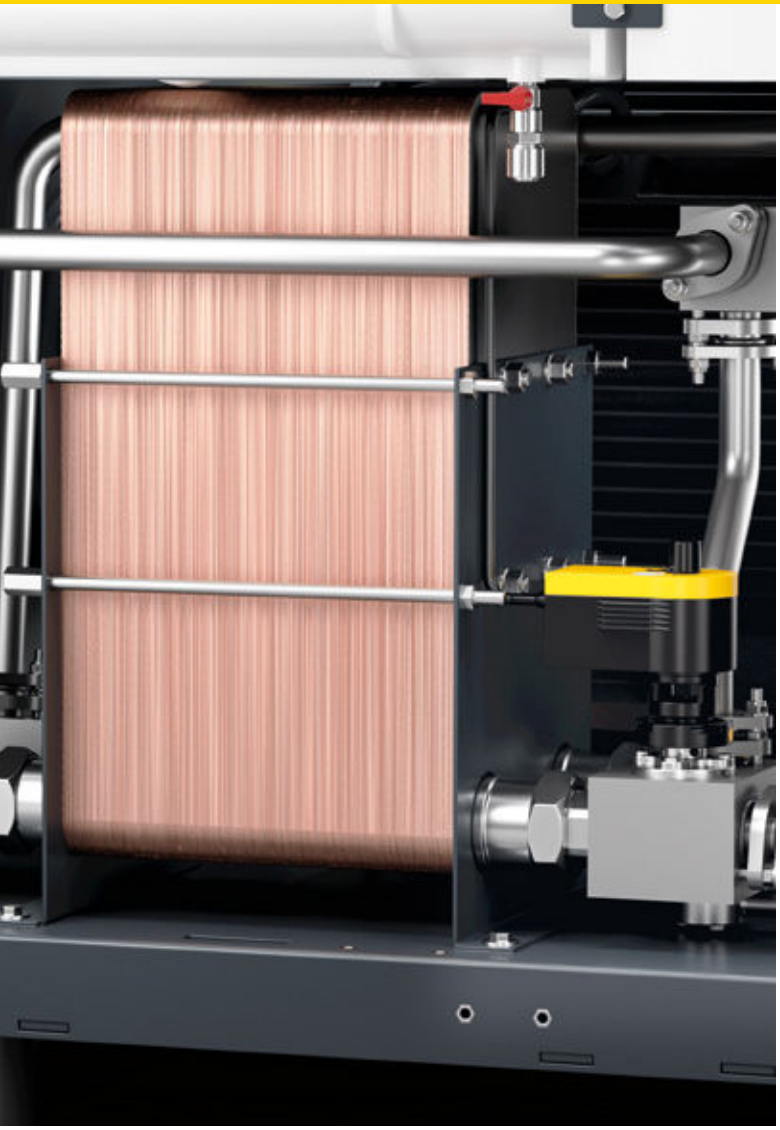
CO_2 savings with heat recovery

Up to 96% of a compressor's electrical power consumption can be recovered as heat energy. Make use of this potential and obtain your compressed air and heat from a single source: the CO_2 savings potential in comparison with oil or gas heating is considerable.

Space heating with hot exhaust air

Even an air-cooled CSD(X) without special equipment can supply an impressive amount of heat: thanks to the radial fan with high residual thrust, hot exhaust air can often be easily ducted away to spaces that require heating without need of an auxiliary fan.





Optional hot water generation

With the optional integrated heat recovery system, an additional plate-type heat exchanger and a second ETM valve are installed. This allows a CSD(X) compressor to provide hot water up to 70 °C!

Flexible in every respect – thanks to SIGMA CONTROL 2 and ETM

The SIGMA CONTROL 2 controller enables precise setting of the airend discharge temperature required for the compressed air in order to achieve the desired water discharge temperature from the heat recovery system. When heat recovery is not required, this feature can be deactivated via the SIGMA CONTROL 2. In this case, the airend discharge temperature is flexibly adjusted in order to save energy and prevent condensate formation.

Maximum energy savings

The more heat discharged via the hot water, the slower and therefore more energy-efficiently the frequency-controlled fan is operated.

Example savings calculation for hot air heat recovery on a CSDX 175

Total power consumption CSDX 175	Approx. 110 kW
Maximum available heat output (96% of total power consumption)	105.6 kW
Compressor load hours per day	8 h
Heating periods per year	100 days

Savings compared to oil heating	
Calorific value	10.6 kWh/l
Price	€ 1.50/l
CO_2 emissions	2.8 kg CO_2/l
Heating efficiency	90%
Heating cost saving	**Approx. € 13,280 per year**
CO_2 saving	**Approx. 24,800 kg CO_2/year**

Savings compared to gas heating	
Calorific value	11 kWh/m³
Price	€ 1.20/m³
CO_2 emissions	2.0 kg CO_2/m³
Heating efficiency	90%
Heating cost saving	**Approx. € 10,240 per year**
CO_2 saving	**Approx. 17,060 kg CO_2/year**

Tailor-made efficient system solutions!

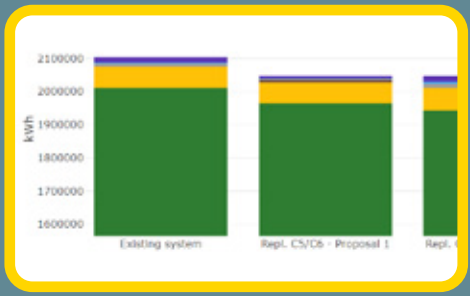
Regardless of whether you are planning a completely new air station or just replacing individual compressors, it pays to take a close look at the options available. As a compressed air systems provider with decades of experience, we can support you with an analysis of your system requirements and help you to find the optimum solution in every respect, from energy efficiency to compressed air quality and availability.

Your company situation

A KAESER-trained specialist will speak to you about your objectives and plans, then take stock of your existing compressed air station. Even at this early stage, we will focus on optimisation potential, e.g. intake and cooling air flows, correct dimensioning of pipes, etc.

ADA (Air Demand Analysis)

Now we get down to the detail: In order to precisely determine compressed air demand, as well as the running characteristics of the individual compressors, KAESER's own sensors and data loggers are installed. Depending on the size of the station, this can even be achieved during the first visit!



KESS (KAESER Energy Saving System)

Based on the data collated, different design solutions can now be simulated using our KESS software. The objective is clear: to find the optimum combination of compressors, buffer volumes and different control parameters for your operation. We will produce a comprehensive report containing all the information you need to make your decision.

A solution to meet your individual needs

Once we have identified the optimum solution, we will help you to achieve it. As a compressed air systems provider, we can offer detailed planning of the entire compressor station, from the compressors to the compressed air treatment and the controller. This includes P&I diagrams, installation diagrams and 3D drawings of your compressed air station.

KAESER AIR SERVICE

Non-stop excellence

One of the key requirements for any compressed air supply is maximum availability. To guarantee this on a continuous basis, KAESER AIR SERVICE is always there for you. No matter whether it's performing commissioning, maintenance or repairs, our customer service stands out for its excellence. Around the clock. Worldwide.

KAESER AIR SERVICE is there, wherever you need it: all around the globe, highly qualified service technicians are ready to assist you. Our customer service ensures perfectly executed maintenance and repair work for maximum efficiency. Close proximity ensures a rapid response, which translates into maximum compressed air availability.

KAESER AIR SERVICE ensures a long service life for your compressed air system: perfectly matched service concepts and high-quality, genuine KAESER parts guarantee sustainable operation of your compressed air supply. KAESER service vehicles are stocked with a comprehensive range of maintenance and spare parts, ensuring that many types of repair can be carried out immediately. Should additional parts be required, the advanced logistics centre at the main plant in Coburg will ship the necessary items overnight.

24-hour support

Compressed air needs to be available all day, every day, which is why technical support staff, replacement parts and service technicians are on standby 24/7.

Free service number

08000 523 737

The foundations of product development

KAESER sets new standards when it comes to dependability, efficiency and sustainability. However, we are still not satisfied. Our products and services are continuously being optimised, with the objective of achieving ever-greater energy efficiency, best possible compressed air availability and optimum cost efficiency for our customers. KAESER products are designed not only to be extremely efficient during operation; energy consumption is also minimised as far as possible during the production process. When it comes to our own investments and purchasing, we strive to find ever more energy-efficient products and services. KAESER's innovations help to reduce energy consumption significantly and to save operating costs. They also

RETHINK

Think and rethink anew

Sustainable product development requires new approaches and ways of thinking.

KAESER trains selected employees in Design Thinking at the Hasso Plattner Institut, thereby achieving new and innovative approaches to product development.

RESEARCH

Develop knowledge!

For more than 100 years, KAESER has continuously developed its knowledge of compressed air technology.

Today, state-of-the-art simulation and calculation tools, together with the validation of prototypes, provide the basis for the acquisition of knowledge.

This in turn establishes the basis for a highly efficient, dependable and resource-friendly compressed air supply.

contribute to the preservation of resources and the reduction of emissions. Our energy-efficient solutions help our customers to achieve their own sustainable and environmentally responsible operation.
True to the KAESER philosophy of “More compressed air for less energy", our products not only operate extremely cost-efficiently and in the most eco-friendly manner, they also consume as few valuable environmental resources as possible during production, sales and service.

REDUCE

Reduce resource consumption!

The highest resource consumption in compressed air technology occurs over long-term operation.

Accordingly, the compressed air supply must save energy. For KAESER, efficiency is the ultimate goal.

REPAIR

Maintenance-friendly design!

Maintenance-friendly design and repairability are evaluated and optimised by KAESER’s service technicians during the development process.

Equipment

Complete system

Ready-to-run, fully automatic, super silenced, vibration damped, all panels powder coated. Suitable for use in ambient temperatures up to +45 °C

Sound insulation

Panels lined with laminated mineral wool

Vibration damping

Double-insulated anti-vibration mounts with metal elements

Airend

Genuine KAESER single-stage airend with energy-saving SIGMA PROFILE and cooling fluid injection for optimised rotor cooling.

Drive

Highly efficient transmission via case-hardened timing gears; dedicated cooling fluid injection for optimum lubrication

Electric motor

Standard system with Super Premium Efficiency IE4 drive motor, quality German manufacture, IP 55, Iso F class insulation for additional reserve; Pt100 temperature sensor in windings for monitoring of the motor; A-bearings lubricated by cooling fluid, B-bearings regreasable

Optional SFC frequency control

Synchronous reluctance motor (except on CSDX 200 SFC: permanent magnet motor), quality German manufacture, IP 55, with Siemens frequency converter, motor with IE5 efficiency class, drive system with IES2 efficiency class

Electrical components

IP54 control cabinet, control transformer, floating contacts e.g. for ventilation system, configurable digital and analogue inputs and outputs

Cooling fluid and air flow

Dry air filter; pneumatic inlet and venting valve; cooling fluid reservoir with three-stage separator system; safety valve, minimum pressure check valve, Electronic Thermo Management (ETM) and ECO fluid filter in cooling fluid circuit; fully piped, flexible line connections

Cooling

Air-cooled; separate aluminium cooler for compressed air and cooling fluid; radial fan with frequency-controlled EC motor, Electronic Thermo Management (ETM); water-cooled version optionally available (see options)

Refrigeration dryer

CFC-free, R-513A refrigerant, hermetically sealed refrigerant circuit, scroll refrigerant compressor with energy-saving shut-off feature, hot gas bypass control, electronic condensate drain, upstream centrifugal separator

Heat recovery (HR)

Optionally available with integrated HR system (plate-type heat exchanger)

SIGMA CONTROL 2

“Traffic light” LED indicators display operating status at a glance, plain text display, 30 selectable languages, soft-touch keys with icons, fully automatic monitoring and control; selection of DUAL, QUADRO, VARIO, DYNAMIC, MONO operating modes; Ethernet interface; SD card slot for data-logging and updates; RFID reader; web server; additional optional communications modules for: Profibus DP, Modbus TCP, Modbus RTU, Profinet IO, EtherNet/IP and DeviceNet

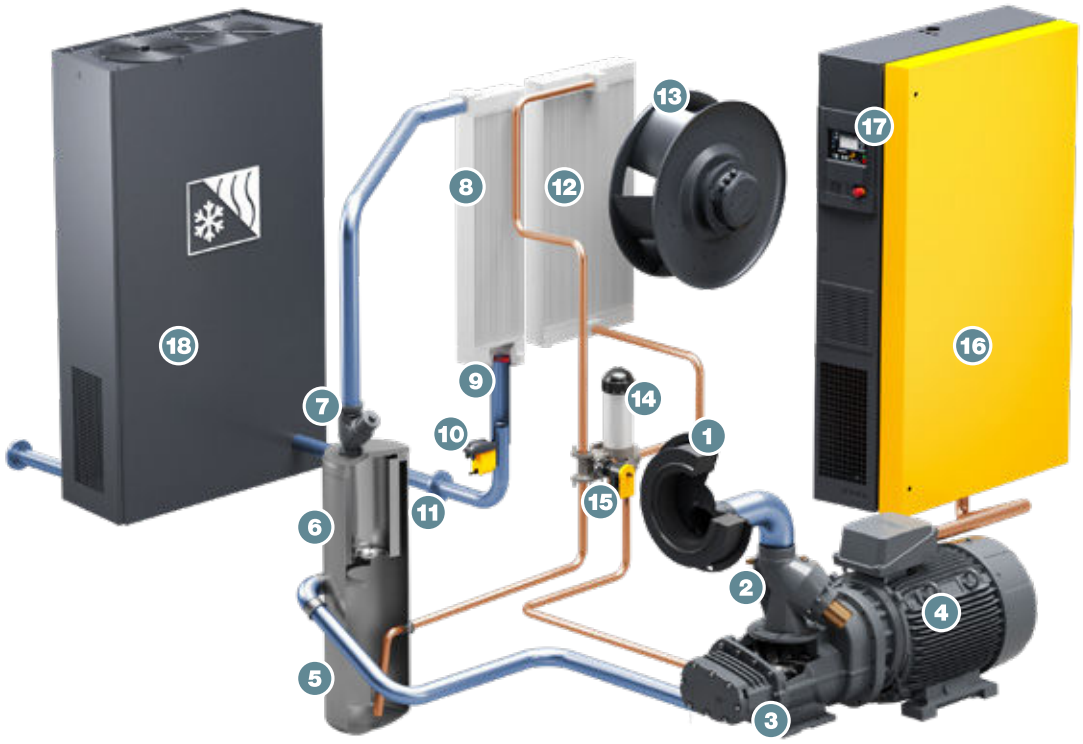
Options

- Integrated heat recovery for heating of water via plate-type heat exchanger. Available with ΔT = 25 K or ΔT = 55 K
- Integrated water-cooling, optionally equipped with plate-type heat exchangers (ideal for clean cooling water) or shell and tube heat exchangers (robust against contamination and easy to clean)
- Cooling air filter mats for protecting the cooler from contamination
- Bolt-down machine feet for secure fixing of compressor at installation location
- MODULATING CONTROL
- Equipped for connection to IT power network (SFC systems only)
- Fluid-fill with food-grade fluid (NSF H1)

How it works

The air for compression passes through the intake filter (1) and the inlet valve (2) into the SIGMA PROFILE airend (3). The airend (3) is driven by a high-efficiency electric motor (4). The cooling oil injected for cooling purposes during compression is separated from the air in the fluid separator tank (5). The compressed air flows through the 2-stage oil separator cartridge (6) and the minimum pressure check valve (7) into the compressed air aftercooler (8). Following cooling, any accumulated condensate is removed from the compressed air by the integrated centrifugal separator (9) and then drained away via the add-on ECO-DRAIN condensate drain (10). The condensate-free compressed air then exits the system via the compressed air connection (11). The heat generated during the compression process is removed from the cooling oil via the fluid cooler (12) and dissipated into the surrounding environment by a frequency-controlled fan unit (13). The cooling oil is then cleaned by the ECO fluid filter (14). The Electronic Thermo Management system (15) ensures efficient and reliable low operating temperatures. The control cabinet (16) houses the internal SIGMA CONTROL 2 compressor controller (17) and, depending on the compressor version, the star-delta starter or the frequency converter (SFC). Versions are available featuring an add-on refrigeration dryer (18) that cools the compressed air down to +3 °C, thereby ensuring effective moisture removal.

(1) Intake filter
(2) Inlet valve
(3) SIGMA PROFILE airend
(4) IE4 / IE5 drive motor
(5) Fluid separator tank
(6) Oil separator cartridge
(7) Minimum pressure check valve
(8) Compressed air aftercooler
(9) KAESER centrifugal separator
(10) Condensate drain (ECO-DRAIN)
(11) Compressed air connection
(12) Fluid cooler
(13) Fan motor
(14) ECO fluid filter
(15) Electronic Thermo Management
(16) Control cabinet with optional SFC frequency converter
(17) SIGMA CONTROL 2 compressor controller
(18) Optional add-on refrigeration dryer



The world is our home

As one of the world's largest manufacturers of compressors, blowers and compressed air systems, KAESER KOMPRESSOREN is represented throughout the world by a comprehensive network of wholly owned subsidiaries and authorised distribution partners in over 140 countries.

By offering innovative, efficient and reliable products and services, KAESER KOMPRESSOREN's experienced consultants and engineers work in close partnership with customers to enhance their competitive edge and to develop progressive system concepts that continuously push the boundaries of performance and technology. Moreover, decades of knowledge and expertise from this industry-leading systems provider are made available to each and every customer via the KAESER group's advanced global IT network.

These advantages, coupled with KAESER's worldwide service organisation, ensure that every product operates at the peak of its performance at all times, providing optimal efficiency and maximum availability.

KAESER KOMPRESSOREN SE
P.O. Box 2143 – 96410 Coburg – GERMANY – Tel +49 9561 640-0 – Fax +49 9561 640-130
E-mail: productinfo@kaeser.com – www.kaeser.com

P-651/26ED Specifications subject to change without notice. .5/23