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KAESER COMPRESSORS

HPC Compressed Air Systems

Rotary Screw Compressors ESD Series

With the world-renowned SIGMA PROFILE

Free air delivery 23.10 to 42.20 m³/min, Pressures 8.5 – 12 – 15 bar

ESD Series

ESD – A new class standard

KAESER KOMPRESSOREN pushes the boundaries of compressed air efficiency once again with its latest generation of **ESD** series rotary screw compressors. Intelligent design solutions have not only lead to enhanced ease of operation and serviceability, but also give this series of class-defining compressors their distinctive appearance.

ESD: The multi-saver

These high performance systems help save energy in multiple ways:
1. Flow-optimised SIGMA PROFILE rotors improve specific power.
2. The use of IE3 drive motors maximises energy efficiency (these motors will become mandatory in the EU from the 1st of January 2015).
3. Kaeser's 1:1 drive design eliminates the transmission losses associated with gear or V-belt driven systems, as the motor directly drives the airend.
4. The SIGMA CONTROL 2 compressor controller optimises performance by using specially developed control algorithms.

Ease of maintenance ensures savings

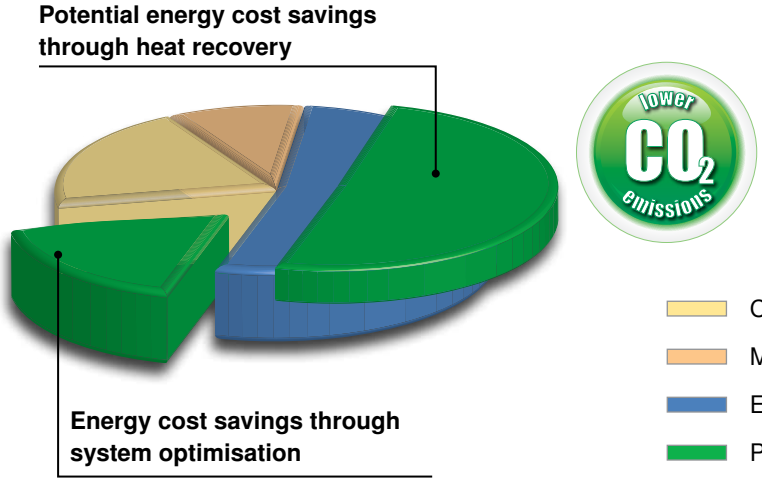
The distinctive and eye-catching design of these systems from the outside is complemented by intelligent component layout on the inside for even greater energy efficiency: All service and maintenance points are within easy reach and directly accessible from the front of the unit. This not only saves time and money, but also maximises compressed air system availability.

Perfect partners

ESD series rotary screw compressors are the perfect partners for high-efficiency industrial compressed air stations. The internal SIGMA CONTROL 2 compressor controller offers numerous communication channels, which allows seamless communication with advanced master controllers, such as KAESER's SIGMA AIR MANAGER, and in-house centralised control systems. This enables simple setup and achieves unprecedented levels of efficiency.

Effective cooling

KAESER's innovative cooling concept features external coolers to provide significant user advantages: Because the ambient air that is drawn in is not "pre-warmed", it provides significantly enhanced cooling performance. Moreover, cooler status can be checked at a glance and these compact units can be easily cleaned from the exterior.



KAESER COMPRESSORS

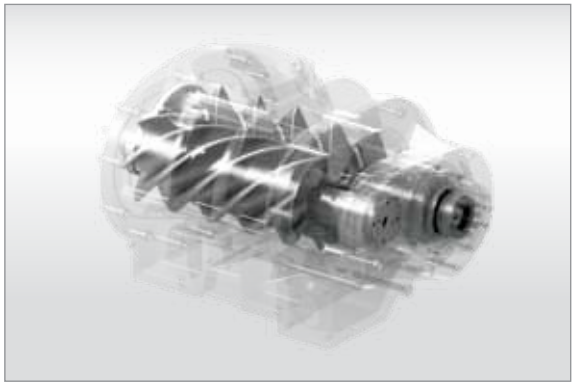
Efficiency redefined

Image: ESD 442 SFC with variable speed control

0.0 bar
09:26
0 °C
Log-in successful
Change password:
Name:
K00000100
Level:
5
Valid until:
02/2015
KAESER
RFID
SIGMA CONTROL 2
KAESER KOMPRESSOREN
02/2015
www.kaeser.com

ESD series

KAESER quality and efficiency for every need



SIGMA PROFILE

At the heart of every ESD system lies a premium quality airend featuring Kaeser's SIGMA PROFILE rotors. Flow-optimised for impressive performance, these advanced rotors help Kaeser systems set the standard for superior efficiency.

SIGMA CONTROL 2

The SIGMA CONTROL 2 delivers efficient control and system monitoring. The large display and RFID reader ensure simple communication and maximum security. Multiple interfaces offer exceptional flexibility, whilst the SD card slot makes updates quick and easy.

Maximum efficiency: IE3 motors

Use of these motors will become mandatory in the EU from the 1st of January 2015, but users can already enjoy the benefits that these premium efficiency motors have to offer by choosing KAESER ESD series rotary screw compressors.

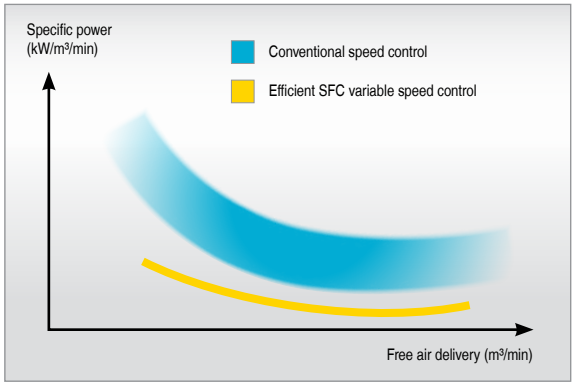
Centrifugal separator with ECO DRAIN

The centrifugal separator removes large volumes of condensate from the compressed air. This significantly reduces the load on downstream treatment systems and therefore saves energy.

Image: ESD 442 SFC

ESD SFC series

Variable speed control perfected



Optimised specific power

The variable speed compressor is the most heavily loaded piece of equipment in every compressor station. ESD-SFC models are therefore designed to provide maximum efficiency without running at extreme speeds. This saves energy, maximises service life and enhances reliability.

Precision pressure control

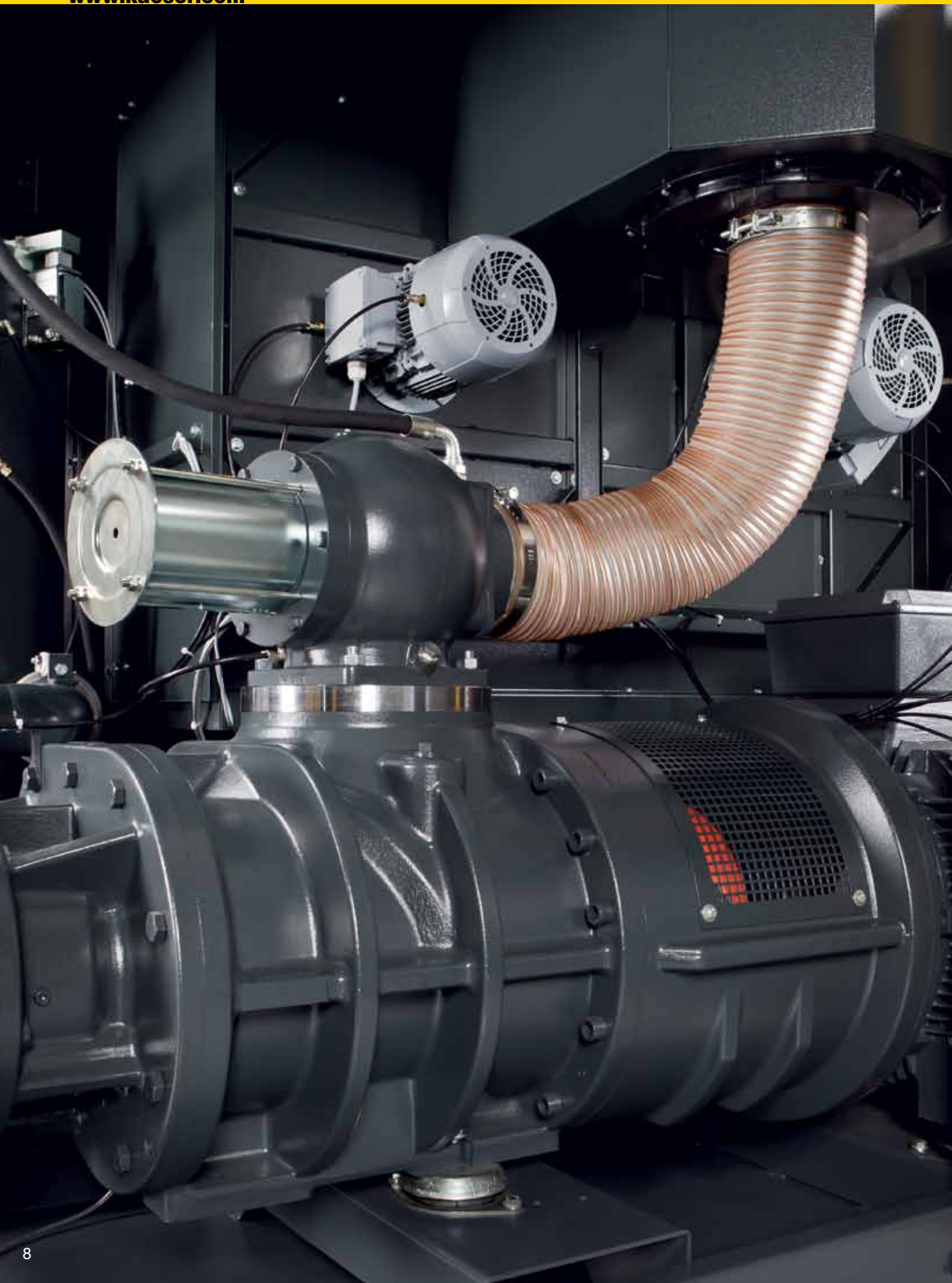
The volumetric flow rate can be adjusted within the control range according to pressure to suit actual compressed air demand. As a result, operating pressure is precisely maintained to within ±0.1 bar. This allows maximum pressure to be reduced which saves both energy and money.

Separate SFC control cabinet

The SFC variable speed drive is housed in its own control cabinet to shield it from heat from the compressor. A separate fan keeps operating temperatures in the optimum range to ensure maximum performance and service life.

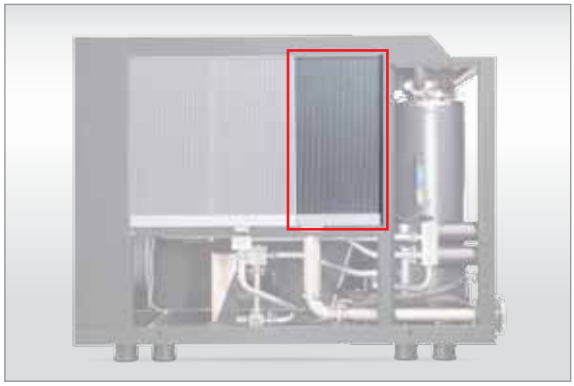
EMC-certified

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



ESD series

Innovative cooling concept with separated air flow



Low compressed air temperature

The large cooler significantly improves compressed air aftercooling. The centrifugal separator removes large volumes of condensate which is then drawn off, without energy loss, via the electronically-controlled ECO DRAIN condensate drain. This subsequently reduces the burden on downstream treatment equipment.

Low operating temperature

Thermostat-controlled fans with variable speed motors produce the exact amount of cooling air required to ensure low operating temperatures. This significantly reduces the overall energy demand of ESD rotary screw compressor systems.

Coolers cleaned from the outside

Unlike internally installed coolers, the exterior heat exchangers in ESD systems are easy to access and simple to clean. Operational reliability and availability are therefore enhanced, as dirt build-up is easily spotted.

E-motors lubricated from the outside

Electric motors must be lubricated while running. In ESD systems, service staff can easily perform this task from the outside of the machine. This applies to both the compressor drive motor and the fan motors.

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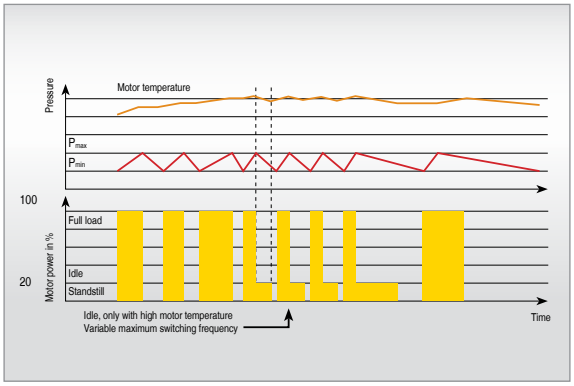
ESD series

Intelligent design solutions

Your choice of heat exchanger

In water-cooled systems, integrated plate or tube-type heat exchangers are available, depending on the water quality. Our compressed air specialists can advise you which design is right for your particular needs.



Efficient dynamic control

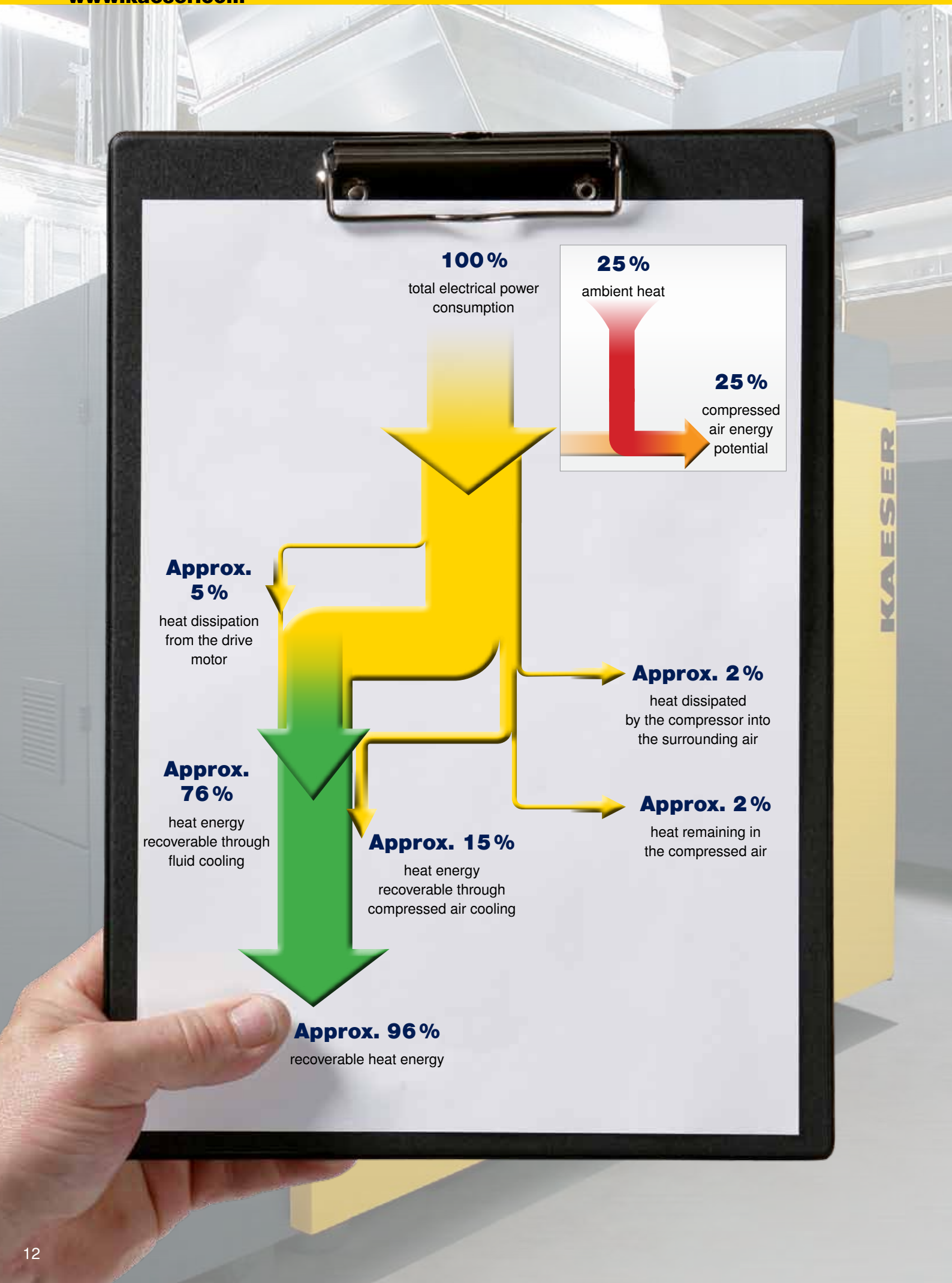
To calculate run-on periods, dynamic control monitors the motor winding temperature. This reduces idling times and energy consumption. The SIGMA CONTROL 2 offers additional control modes as required.

High residual thrust exhaust air

The integrated radial fans are considerably more efficient than axial fans and provide high residual thrust. This generally enables the warm exhaust air to be directly ducted away without the need for an auxiliary fan.

Service-friendly

Just as the air filter is simple to change from the front of the unit, all other maintenance components are also easy to access. This streamlines maintenance and service work, thereby reducing operating costs and increasing reliability.


100 %
total electrical power consumption
25 %
ambient heat
25 %
compressed air energy potential
Approx. 5 %
heat dissipation from the drive motor
Approx. 2 %
heat dissipated by the compressor into the surrounding air
Approx. 76 %
heat energy recoverable through fluid cooling
Approx. 2 %
heat remaining in the compressed air
Approx. 15 %
heat energy recoverable through compressed air cooling
Approx. 96 %
recoverable heat energy
KAESER

ESD series

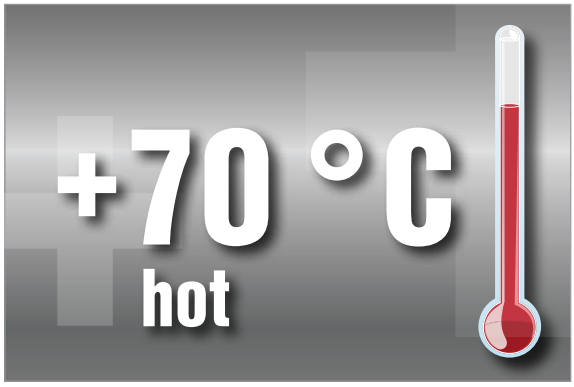
Benefit from heat energy

Systems for hot water usage

The integrated system comprising the plate heat exchanger, thermostatic valve and complete pipework requires no additional space in the compressor and can recover 76% of the overall power consumption of ESD compressors by utilising the heat in the water.

Space heating with warm exhaust air

It's heating made easy: Thanks to the high residual thrust radial fan, exhaust (warm) air can be easily ducted away to spaces that require heating. This simple process is thermostatically controlled.



Process, heating and service water

Hot water, up to 70 °C, can be produced from reusable compressor heat via PWT and SWT heat exchanger systems. Please contact KAESER regarding higher temperature requirements.

Heat recovery a win

Amazingly, 100 percent of the electrical energy input to a compressor is converted into heat. From that, up to 96 percent is available for heat recovery purposes. Use this potential to your advantage!

KAESER
KAESER

ESD 352
SIGMA
FSD 471
KAESER

Equipment

Complete unit

Ready for operation, fully automatic, super-silenced, vibration damped, all panels powder coated. Can be used in ambient temperatures up to +45 °C. Service-friendly design: Motor bearings can be lubricated externally (also applies to drive and fan motors).

Airend

Genuine KAESER single-stage rotary screw airend with energy-saving SIGMA PROFILE rotors and cooling fluid injection for optimised rotor cooling. 1:1 direct drive.

Rotary screw airend with energy-saving SIGMA PROFILE rotors

Fluid and air flow

Dry air filter with preseparation, inlet silencer, pneumatic inlet and venting valve, cooling fluid reservoir with three-stage separation system; pressure relief valve, minimum pressure check valve, thermostatic valve and eco fluid filter in cooling circuit, fluid and compressed air aftercooler (air-cooled as standard); two fan motors (one with variable speed control); KAESER centrifugal separator with electronically controlled condensate drain (high efficiency and zero pressure loss); stainless steel pipework and centrifugal separator; Optionally available water-cooled version: Fluid and compressed air aftercooler implemented as water-cooled plate- or optionally available tube-type heat exchanger.

Heat recovery (Option)

Optionally available with integrated fluid/water plate heat exchanger and equipped with additional thermostatic valve for fluid; exterior connections.

Electrical components

Premium efficiency IE3 drive motor with PT-100 coil temperature sensor for motor monitoring, ventilated IP 54 control cabinet, automatic star-delta protection, overload relay, control transformer, frequency converter for fan motor. Frequency converter for drive motor with SFC version.

SIGMA CONTROL 2

"Traffic light" LED indicators show operational status at a glance, plain text display, 30 selectable languages, soft-touch keys with icons, fully automated monitoring and control. Selection of Dual, Quadro, Vario, Dynamic and continuous control as standard. Interfaces: Ethernet; additional optional communication modules for: Profibus DP, Modbus, Profinet and Devicenet. SD-card slot for data-logging and updates; RFID reader, web server.

Technical specifications

Standard version

Model	Working pressure bar	FAD *) Complete package at working pressure m³/min	Max. working pressure bar	Rated motor power kW	Dimensions W x D x H mm	Air connection	Sound pressure level **) dB(A)	Weight kg
ESD 352	7.5	36.20	8.5	200	2800 x 2000 x 2140	DN 125 PN16 DIN	75	4935
	10	29.72	12					
	13	23.10	15					
ESD 442	7.5	42.20	8.5	250	2800 x 2000 x 2140	DN 125 PN16 DIN	76	5000
	10	35.40	12					
	13	28.92	15					

SFC - Version with variable speed drive

Model	Working pressure bar	FAD *) Complete package at working pressure m³/min	Max. working pressure bar	Rated motor power kW	Dimensions W x D x H mm	Air connection	Sound pressure level **) dB(A)	Weight kg
ESD 352 SFC	7.5	8.58 – 33.38	8.5	200	3100 x 2000 x 2140	DN 125 PN16 DIN	76	5805
	10	6.43 – 27.43	12					
	13	5.17 – 23.70	15					
ESD 442 SFC	7.5	10.14 – 41.52	8.5	250	3100 x 2000 x 2140	DN 125 PN16 DIN	77	5825
	10	8.33 – 36.00	12					
	13	6.13 – 29.50	15					

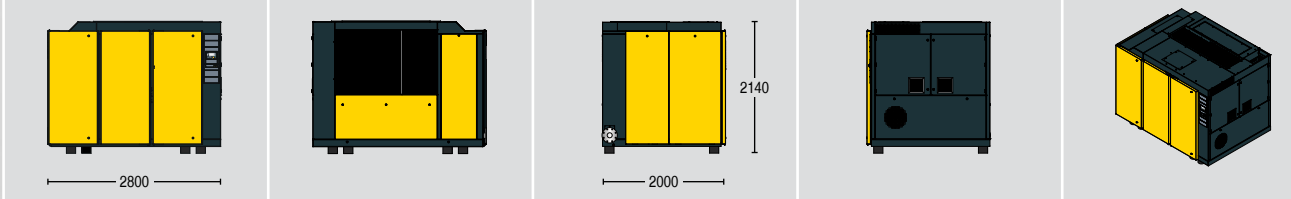
*) FAD complete system as per ISO 1217 : 2009, Annex C: absolute inlet pressure 1 bar (a), cooling and air inlet temperature 20 °C

**) Sound pressure level as per ISO 2151 and the basic standard ISO 9614-2, tolerance: ± 3 dB (A)

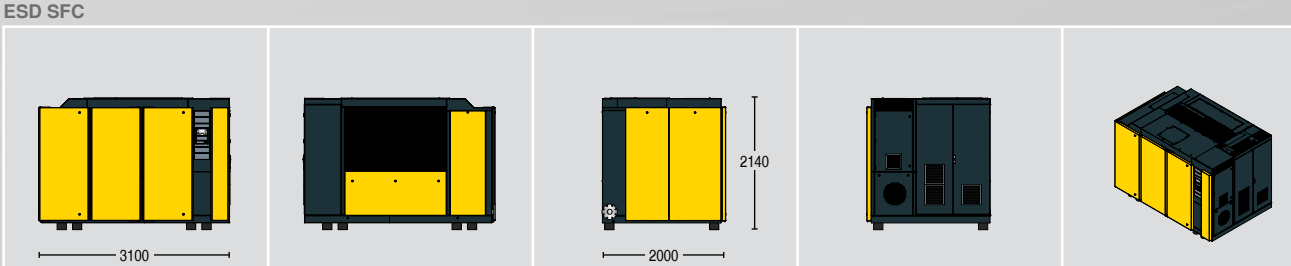
Dimensions

Front view	Rear view	View from left	View from right	3-D view

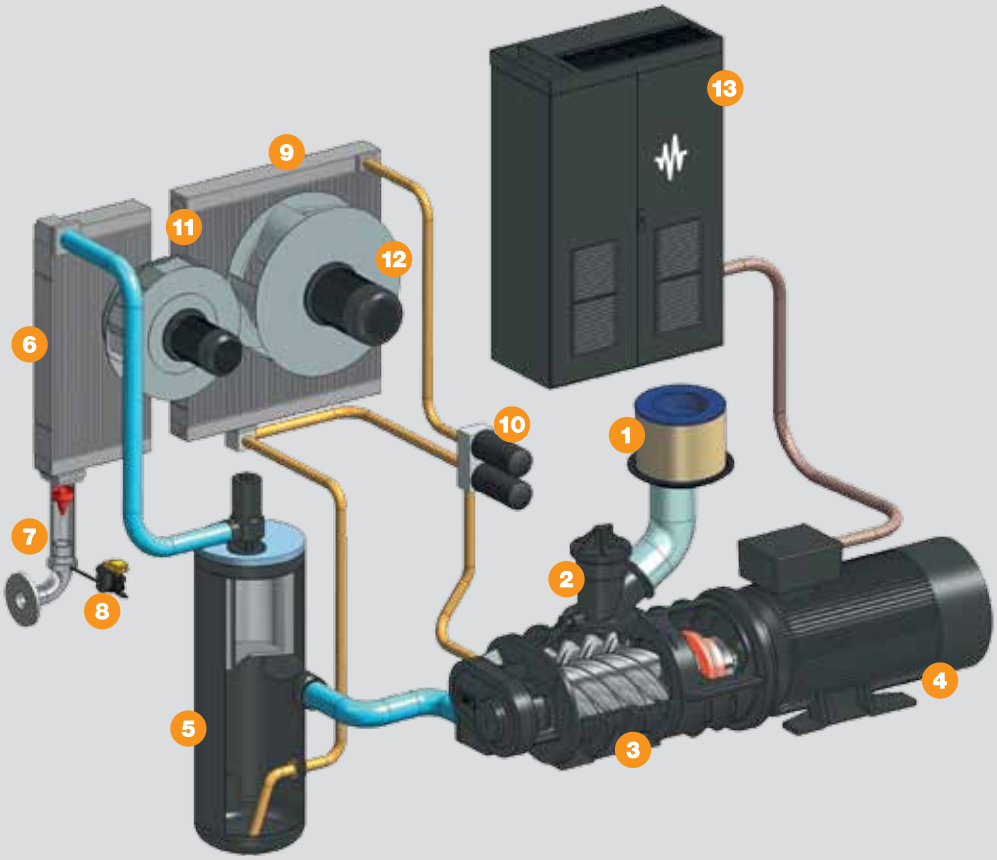
ESD



ESD SFC

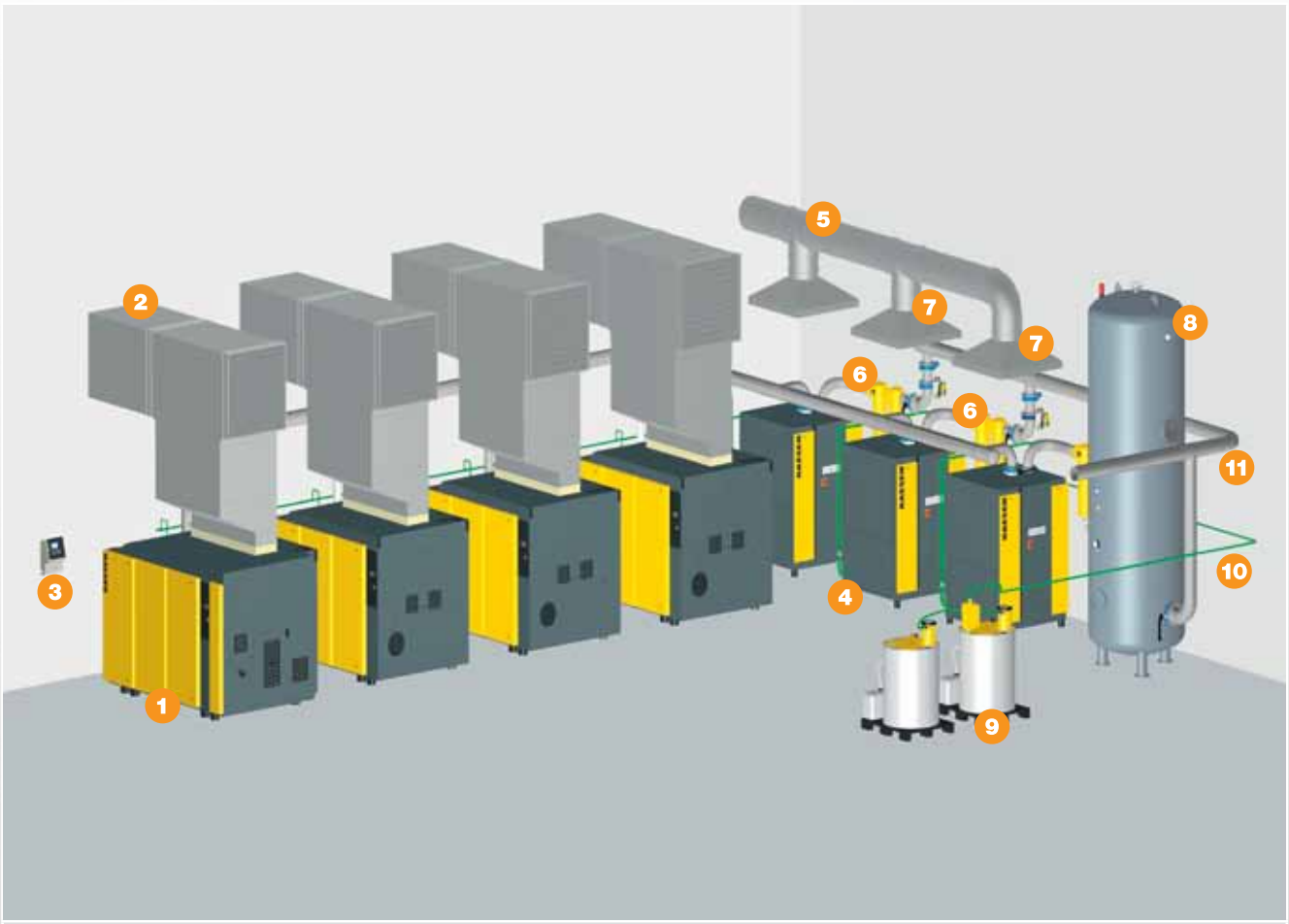


System design



1. Intake filter
2. Inlet valve
3. Airend
4. Premium efficiency drive motor
5. Fluid separator tank
6. Compressed air aftercooler
7. Centrifugal separator
8. Electronic condensate drain
9. Fluid cooler
10. Fluid filter
11. Radial fan
12. Speed-controlled radial fan
13. Control cabinet with integrated SFC frequency converter

CAD planning for complex compressed air stations



1. Rotary screw compressor
2. Exhaust air ducting for rotary screw compressor
3. SIGMA AIR MANGER master controller
4. Refrigeration dryer (redundant)
5. Refrigeration dryer exhaust air duct
6. Filtration (redundant)
7. Electronic air-main charging system (redundant)
8. Air receiver
9. AQUAMAT condensate treatment system
10. Condensate pipework
11. Compressed air pipework

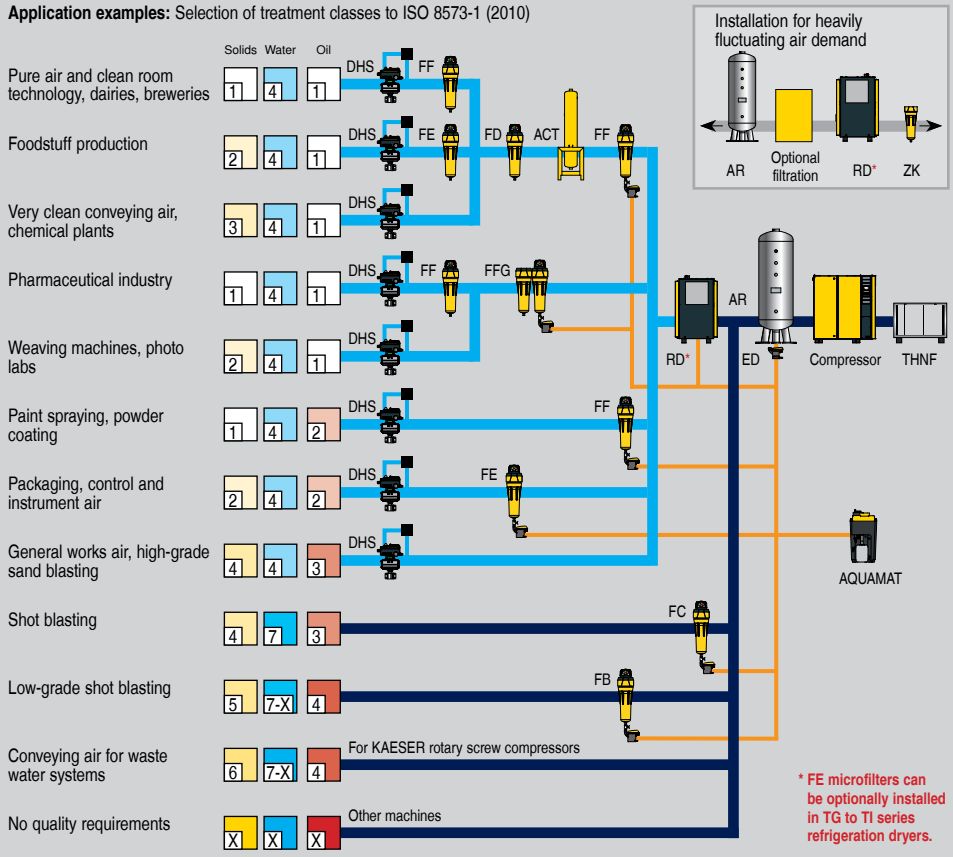
A layout example for a compressed air station with ESD rotary screw compressors and compressed air treatment with SECOTEC energy-saving refrigeration dryers.

We provide specially tailored compressed air systems suited to spatial requirements; this includes compressed air treatment, exhaust ducting, compressed air pipework and condensate lines.

Choose the required grade of treatment according to your field of application:

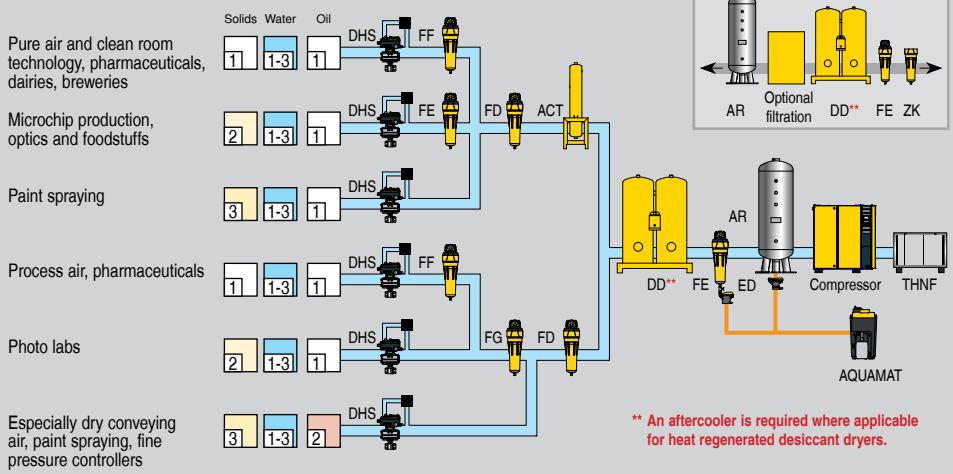
Air treatment using a refrigeration dryer (pressure dew point +3 °C)

Application examples: Selection of treatment classes to ISO 8573-1 (2010)



* FE microfilters can be optionally installed in TG to TI series refrigeration dryers.

For non frost protected air systems: Compressed air treatment with a desiccant dryer (down to -70 °C pressure dew point)



** An aftercooler is required where applicable for heat regenerated desiccant dryers.

Explanation	
ACT	Activated carbon adsorber
AQUAMAT	AQUAMAT
DD	Desiccant dryer
DHS	Air-main charging system
AR	Air receiver
ED	ECO DRAIN
FB / FC	Pre-filter
FD	Particulate filter
FE / FF	Microfilter
FFG	Activated carbon and microfilter combination
FG	Activated carbon filter
RD	Refrigeration dryer
THNF	Bag filter
ZK	Centrifugal separator

Compressed air quality classes to ISO 8573-1(2010):

Solid particles / dust

Class	max. particle count per m³ of a particle size with d [µm]*		
	0.1 ≤ d ≤ 0.5	0.5 ≤ d ≤ 1.0	1.0 ≤ d ≤ 5.0
0	e.g. Consult KAESER regarding pure air and cleanroom technology		
1	≤ 20,000	≤ 400	≤ 10
2	≤ 400,000	≤ 6,000	≤ 100
3	Not defined	≤ 90,000	≤ 1,000
4	Not defined	Not defined	≤ 10,000
5	Not defined	Not defined	≤ 100,000

Class	Particle concentration C_p in mg/m³ *
6	$0 < C_p \leq 5$
7	$5 < C_p \leq 10$
X	$C_p > 10$

Water

Class	Pressure dew point, in °C
0	e.g. Consult KAESER regarding pure air and cleanroom technology
1	≤ – 70 °C
2	≤ – 40 °C
3	≤ – 20 °C
4	≤ + 3 °C
5	≤ + 7 °C
6	≤ + 10 °C

Class	Concentration of liquid water C_W in g/m³ *
7	$C_W \leq 0.5$
8	$0.5 < C_W \leq 5$
9	$5 < C_W \leq 10$
X	$C_W > 10$

Oil

Class	Total oil concentration (fluid, aerosol + gaseous) [mg/m³]*
0	e.g. Consult KAESER regarding pure air and cleanroom technology
1	≤ 0.01
2	≤ 0.1
3	≤ 1.0
4	≤ 5.0
X	> 5.0

*) At reference conditions 20 °C, 1 bar(a), 0% humidity

HPC Compressed Air Systems

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