KAESER COMPRESSORS

Rotary Screw Compressors

ESD Series

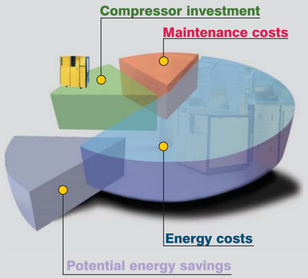
Air deliveries from 20.5 to 42 m³/min
Pressure 5.5 to 15 bar

KAESER COMPRESSORS

What qualities do users look for in a compressor?

Normally, the answer would be efficiency and reliability. That may sound simple, but a lot of very different factors play an important part.

Energy costs, for example, taken over the lifetime of a compressor, add up to a multiple of investment costs.



This is why efficiency is vital in the production of compressed air.

Another major factor is the reliability of air supplies in the quality and quantity needed. This is the most significant requirement for production plant that relies on compressed air.

Reliability also means a supply of air of constant quality that increases the efficiency of air treatment equipment downstream of the compressor.

Nonetheless important is the influence of minimum maintenance on the economical use of a compressor package. This is achieved with high-grade, durable components logically laid out to be easily accessible. KAESER's rotary screw compressors fulfil these requirements entirely, providing the basis for a highly efficient, reliable and user-friendly air system.

ESD – A quantum leap in efficiency

KAESER has the answer - the ESD series

The new ESD screw compressors are a consequent reaction to customers' needs: economical power consumption, low noise emission, low servicing effort, maximum reliability and even better air quality.

Many innovative solutions were needed during the design of the drive system involving overall cooling, soundproofing and the reduction of servicing requirements.

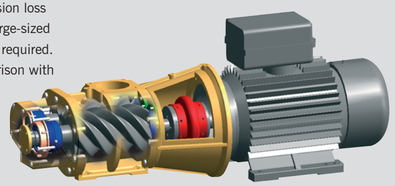
The result is a mature and reliable product of recognised KAESER quality - the new ESD series.

A fresh, cool breeze

- **Cooling air is drawn directly from the ambient air,** routed through the cooler and exhausted upwards through the cooler box. There is no preheating of the cooling air and optimum cooling (difference between compressed air outlet and ambient temperatures only 5-8 K) is ensured. The energy requirement for subsequent air drying is significantly lowered
- **Cooling air for the motor is drawn directly from the ambient air,** motor cooling is assisted by a radial fan which creates a vacuum within the cabinet, resulting in reliable and highly effective cooling of the motor even under unfavourable operating conditions
- **Inlet air for the airend is drawn directly from the ambient air** without any preheating, increasing the efficiency of compression

One-to-one drive: you can't get more efficient than that

In ESD packages the motor drives the airend directly, without transmission loss via a maintenance-free coupling. This low speed is possible by using large-sized airends that are matched to the individual performances and pressures required. One-to-one drive reduces the number of components needed in comparison with gear drive, increasing reliability and service life. Noise emitted from the package is also reduced. Compared with compressors using small, high speed gear-driven airends, one-to-one drive gives you triple savings:
firstly with efficient power transmission,
secondly with improved power consumption and
thirdly with lowered servicing and related downtime costs.

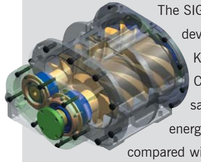


Quiet as a whisper

The low-noise radial fan and the one-to-one drive reduce noise levels considerably, but the main improvement is in the design of the new cooling system; split cooling-air flow allows almost hermetic soundproofing without degradation of cooling efficiency. The ESD series is about 10 dB(A) quieter than conventional compressors of equal performance with noise emissions totalling only 74 to 79 dB(A) under all operating conditions. This corresponds to a reduction in sound power of 90%. You can chat quite normally next to an ESD.

There are three steps to efficiency:

1. The SIGMA Profile



The SIGMA Profile, developed in 1975 by KAESER COMPRESSORS, saved up to 15% in energy consumption compared with conventional rotor profiles. Since then, new airends with even better profiles have been developed for use in the ESD series.

2. One-to-one drive

Some people talk of direct drive, but really mean geared drive. Make sure you know the difference; on ESD packages all that is between the motor and the airend is a coupling.

There are no transmission losses.
The large airends work highly efficiently at low speeds, giving you more air for less power consumption.

3.The radial fan

Quietly and powerfully the radial fan draws in cool ambient air through the cooler. Because of its high residual ventilator thrust it can deal with partial clogging of the cooler and still have enough reserve to allow connection to long exhaust ducts. Even so, the radial fan consumes less drive power than conventional axial fans, saving even more energy.

KAESER COMPRESSORS

More compressed air for less power input

The rated motor powers quoted in the table below are reference points for sizing the ESD package required.

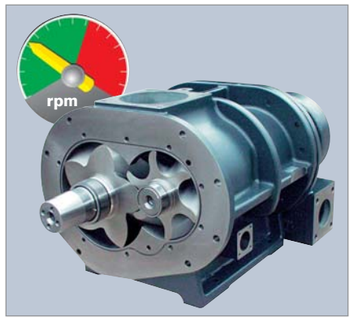
Please contact KAESER COMPRESSORS for specific FADs, motor shaft output powers and other working pressures.

ESD series – technical specifications

Model	Working pressure $bar_{(g)}$	FAD at working pressure* m^3/min	Max. pressure $bar_{(g)}$	Motor power kW	Dimensions W x D x H mm	Soundlevel**) dB(A)	Weight kg
ESD 251	7.5	23.9	8.5	132	2650x2177x2117	74	4920
	7.5	30.6	8.5				
ESD 301	10	23.7	11	160	2650x2177x2117	75	4500
	13	20.6	15				
	7.5	36.8	8.5				
ESD 351	10	30.3	12	200	2650x2177x2117	76	4900
	13	23.1	15				
ESD 361	7.5	35.9	8.5	200	2650x2177x2117	76	5150
	7.5	42	8				
ESD 441	10	36.1	10	250	2650x2177x2117	79	5350
	13	29.9	15				

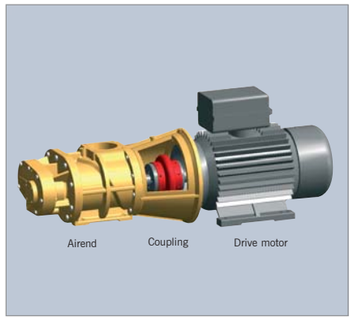
* Capacity to ISO 1217, 1996 Annex C, measured at outlet of the package; **) Noise level to PN8NTC2.3 at 1m distance, free-field measurement

Eight decisive ESD advantages



1 The airend with the SIGMA Profile

Basically, a certain drive power can be transferred with a small airend at high speed or with a large airend at low speed. Large, low speed airends are more efficient. They supply more air for the same drive power. That is why KAESER developed a series of airends for the ESD packages of sizes that precisely match the individual drive power at low drive speeds. The investment in large airends is quickly returned because of the energy savings made during operation.

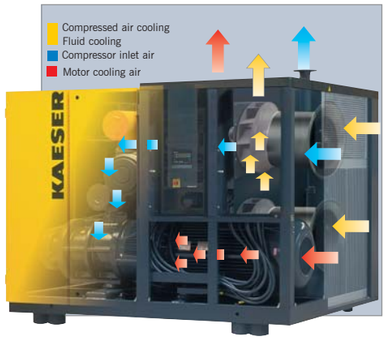


2 The energy-saving one-to-one drive

The advantage of this drive is not just the elimination of transmission losses. The drive motor and the airend are joined by the coupling and its housing into a compact and durable unit that needs no regular maintenance except for greasing the motor bearings. Should the coupling ever need to be replaced it takes just a few minutes without any disassembly of the unit. The opening in the coupling housing is more than large enough to replace the two coupling sections.

3 The innovative radial fan

Quietness and efficiency — these are the most important features of a radial fan. The low noise emission is achieved with low peripheral speeds. The power requirement is around 50 percent below a comparable axial fan. Another advantage of the radial fan is the high residual ventilator thrust that allows exhaust ducting with a pressure drop of up to 100 Pa (ESD 441, 80 Pa) to be fitted without the need for an extra fan.



4 The novel cooling system

This system has other advantages than better cooling efficiency. Cooling air is drawn through the cooler into the cooler box and then exhausted directly upwards so the inside of the package is kept clean as dirt in the cooling air is captured mainly at the inlet side of the cooler which, on ESD packages, is on the outside. Clogging is easy to see and is easily removed without dismantling the cooler. Operational reliability is increased and servicing costs are reduced.

5 An optimised separator system

ESD packages are fitted with a new, even more efficient separator system. The cooling fluid is initially separated from the air to a large extent by centrifugal flow in the separator tank. This means that only a minimum of fluid enters the improved, deep-bed filter in the separator cartridge. These two factors double the service life of the separator cartridge in comparison with conventional systems and ensure minimum aerosol content in the compressed air. The improved air quality makes less work for air treatment components downstream. Monitoring of the pressure drop across the separator cartridge is another contribution to efficient operation. Cartridge changing is made easy by a device that lifts the tank lid and swings it away.

6 Synthetic cooling fluid

SIGMA FLUID has extended the fluid change intervals to over 6,000 operating hours. However, due to the greatly varying ambient conditions often encountered, we recommend a fluid analysis at 6,000 hours to ensure full protection of the machine. But it's not just the longer intervals that save hard cash. SIGMA FLUID has a lower vapour pressure compared with mineral oils that reduces consumption, which is why the proportion of cooling fluid in the condensate is significantly lower. The low emulsifying tendency makes condensate treatment simple and inexpensive. SIGMA FLUIS reduces running costs and increases operational security.

7 Simple cooling fluid change

Changing the cooling fluid is simple, fast and without mess using KAESER's proven system that has been retained for the new ESD packages. The cooling fluid can be drained into a container via a hose that is connected to the quick-disconnect coupling on the separator tank. The hose is supplied as part of the package. The pressure built up in the tank before shutting down aids this process. The advantage to you is shorter downtime and lower servicing costs.

8 The easy-to-use control system

SIGMA CONTROL is based on a robust, updateable industrial computer with a real time operating system. The operational state of the compressor is quickly ascertained with the help of traffic light coloured LEDs. A four-line, plain text display and easily understood icons and touch keys allow fast setting up and operation. SIGMA CONTROL regulates and monitors the compressor fully automatically. If an alarm occurs the compressor is shut down immediately by the safety chain.Dual, Quadro, Vario and continuous control modes are available. The most energy-efficient control mode can be selected depending on actual air needs. Interfaces to a modem or printer, to a second compressor working in sequence and to a data network (Profibus DP) are provided as standard.

Equipment

Overall package

Ready for operation, fully automatic, super silenced, vibration damping, all panels powder coated

Sound insulation

Lined with glass fibre laminated mineral wool; 74-79 dB (A) to PN8NTC2.3 at one metre distance, free-field measurement

Antivibration

Dual antivibration mountings using rubber bonded metal elements

Airend

Genuine KAESER rotary screw, single-stage airend with SIGMA PROFILE and cooling fluid injection; one-to-one drive

Drive

Direct, torsional-elastic coupling, without gearing

Electric motor

Industry-standard, premium efficency electric motor of quality German make, to IP 55 and Insulation Class F for additional reserve; PTC thermistor sensor (full motor protection); externally greased bearings

Joint between electric motor and airend

Cast coupling housing

Electrical components

Control cabinet to IP 54 containing automatic star-delta starter, motor overload protection, control transformer and volt-free contacts for ventilation control

Airflow

Air intake filter with initial separation; pneumatic inlet and venting valves; pressure relief valve; minimum pressure/ check valve, rigid piping with flexible couplings used for fluid/air line; aircooled combination cooler made of aluminium for fluid and compressed air as standard; radial fan with separate electric motor.

Cooling fluid circulation

Cooling fluid reservoir with three-stage separator system; thermostatic valve and fluid filter; charged with SIGMA FLUID PLUS synthetic cooling fluid

Controller

SIGMA CONTROL industrial computer for monitoring and control with interfaces for data communication comprising RS 232 for modem or printer, RS 485 for a slave compressor in base load sequence mode and Profibus DP for data networks; prepared for Teleservice

Ergonomic control panel

Red, yellow and green LEDs (traffic light function) show the operational state of the compressor.

Four-line, plain text display; touch keys and LED icon indications; display of duty cycle.

Some important functions

Fully automatic monitoring and control of airend discharge temperature, motor current, direction of airend rotation, air filter, fluid filter and fluid separator cartridge; display of performance data, status data; hours counters for main components such as motor, etc, operating hours; display of status data and event memory data. Dual, Quadro, Vario and continuous control modes can be selected as required.

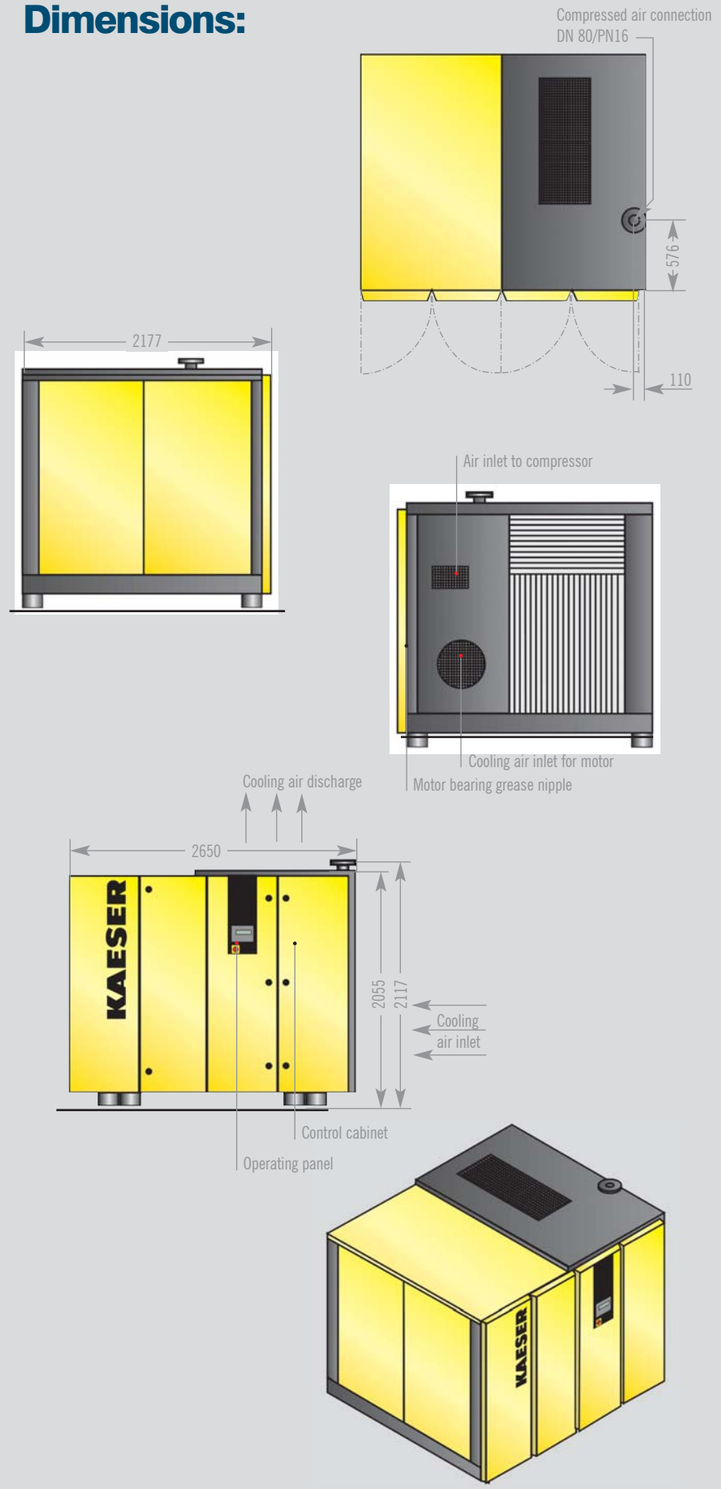
(see SIGMA CONTROL brochure 780)

Comprehensive design know-how

Depending on the application, compressed air systems are often highly complex. They can only be operated efficiently if this fact is adequately taken into account during design, modernisation and during daily operation. KESS (KAESER's Energy Saving Service) is available to you as a comprehensive service concept that calculates the optimum means of supplying the compressed air needed for your factory. This service combines elements such as air components, user advice and services that have proven themselves over years of practice with new ideas made possible by the optimised use of data processing in the compressed air field. Air systems planned and designed by KAESER are characterised by their efficient use of energy. Duty cycle factors for the compressors of 95 percent and more are possible. Air quality tailored to the application at lowest cost and with high operational reliability is a further characteristic typical of a KAESER installation. This high standard has been achieved through years of experience in system and plant design, computer-aided system analysis and 3-D design aids.
Why not take advantage of this know-how and have your air system designed by KAESER COMPRESSORS.

KAESER COMPRESSORS

Dimensions:



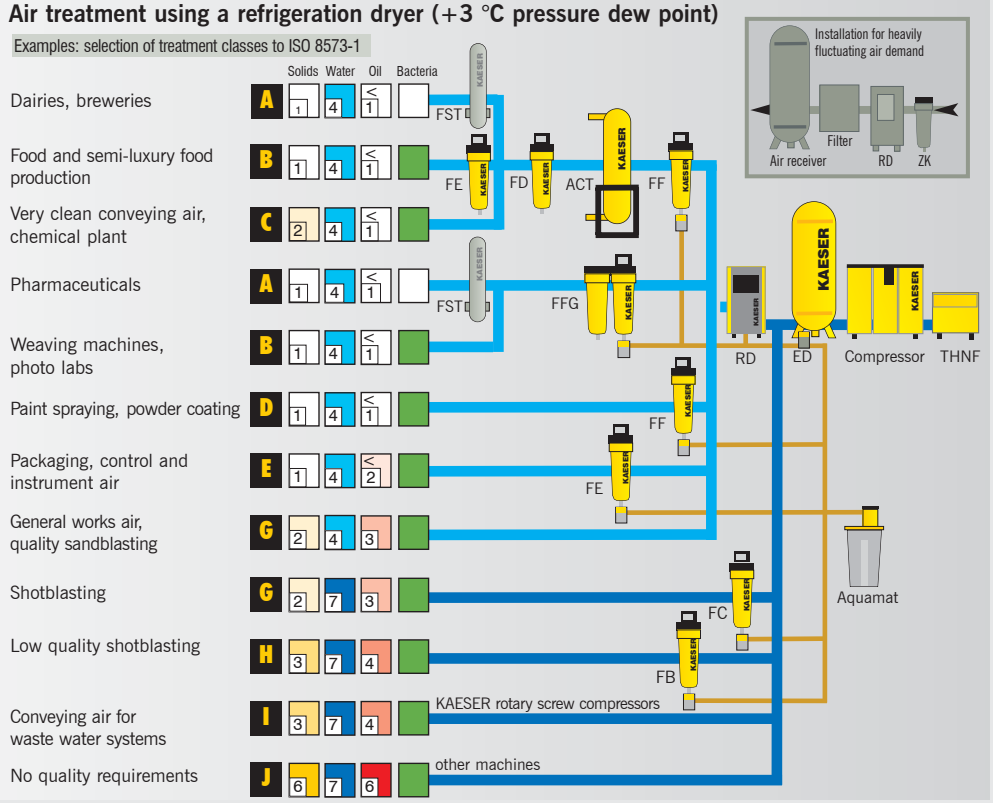
KAESER COMPRESSORS

Different applications need different grades of treatment

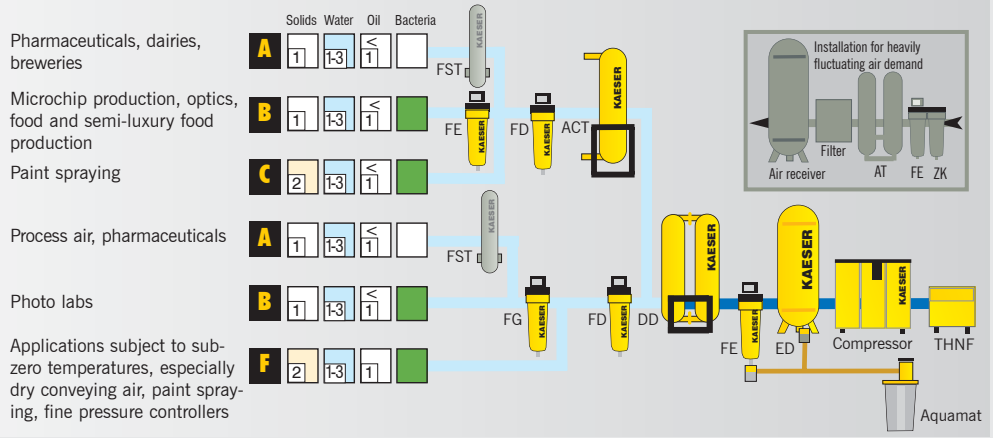
Choose the required grade of treatment according to your field of application:

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

Examples: selection of treatment classes to ISO 8573-1



For air mains subject to sub-zero temperatures: treatment systems with desiccant dryers (pressure dew point to -70 °C)



A Oil vapour content ≤ 0.003 mg/m³, particle retention > 0.01 µm, sterile, odourless and tasteless
B Oil vapour content ≤ 0.003 mg/m³, particle retention > 0.01 µm
C Oil vapour content ≤ 0.003 mg/m³, particle retention > 1 µm
D Aerosol oil ≤ 0.001 mg/m³, particle retention > 0.01 µm
E Aerosol oil ≤ 0.01 mg/m³, particle retention > 0.01 µm
F Aerosol oil ≤ 0.01 mg/m³, particle retention > 1 µm
G Aerosol oil ≤ 1 mg/m³, particle retention > 1 µm
H Aerosol oil ≤ 5 mg/m³, particle retention > 3 µm
I Aerosol oil ≤ 5 mg/m³, particle retention > 1 µm
J Untreated

Explanation:

THNF=bag filter
Cleans dusty intake air

ZK=centrifugal separator
separates accumulating condensate

ED=ECO Drain
electronic level-controlled condensate drain

FB=prefilter 3 µm
separates liquid droplets and solid particles > 3µm, oil content ≤ 5 mg/m³

FC=prefilter 1 µm
separates oil droplets and solid particles > 1µm, oil content ≤ 1 mg/m³

FD=particulate filter 1 µm
separates dust particles (attrition) > 1µm

FE=microfilter 0.01 µm
separates oil aerosols and solid particles > 0.01µm, aerosol content ≤ 0.01 mg/m³

FF=microfilter 0.001 ppm
separates aerosols and solid particles > 0.01µm, aerosol content ≤ 0.001 mg/m³

FG=activated carbon filter
for adsorption of oil vapours, oil vapour content ≤ 0.003 mg/m³

FFG=combination filter
comprising FF and FG

RD=refrigeration dryer
pressure dew point to +3 °C

DD=desiccant dryer
DC series: heatless regeneration, pressure dew point to -70 °C,
DW, DN, DTL, DTW series: heat regeneration, pressure dew point to -40 °C

ACT=activated carbon adsorber
for adsorption of oil vapours, oil vapour content ≤ 0.003 mg/m³

FST=sterile filter
provides bacteria-free compressed air

Aquamat=condensate treatment system

Contaminants:

+	solids -
+	water -
+	oil -
+	bacteria -

Degree of filtration:

ISO 8573-1 Class	Solid particles: Max. no. of particles per m³ with size d (µm) ≤0.1	0.1 < d ≤ 0.5	0.5 < d ≤ 1.0	1.0 < d ≤ 5.0	Solid particles: µm	Solid particles: mg/m³	Humidity: Pressure dew point (x=liquid water in mg/m³)	Overall oil content: mg/m³
0	as specified by user							
1	–	100	1	0	–	–	≤ -70 °C	≤ 0.01
2	–	100000	1000	10	–	–	≤ -40 °C	≤ 0.1
3	–	–	10000	500	–	–	≤ -20 °C	≤ 1.0
4	–	–	–	1000	–	–	≤ +3 °C	≤ 5.0
5	–	–	–	20000	–	–	≤ +7 °C	–
6			–		≤ 5	≤ 5	≤ +10 °C	–
7			–		≤ 40	≤ 10	x ≤ 0.5	–
8			–		–	–	0.5 < x ≤ 5.0	–
9			–		–	–	5.0 < x ≤ 10.0	–

LGA Zertifikat QM System ISO 9001

KAESER KOMPRESSOREN GmbH
Postfach 2143 – 96410 Coburg – Germany – Phone: +49 9561 6400 – Fax: +49 9561 640130
www.kaeser.com – Email: productinfo@kaeser.com