

Rotary Screw Compressors BSD/CSD/CSDX T SFC Series

With the world-renowned SIGMA PROFILE[®]*

Air deliveries from 0.87 to 16.10 m³/min, Pressures 5.5 to 15 bar



T SFC — Integrated Modular Design

What do you look for in a compressor with variable frequency drive and refrigeration dryer?

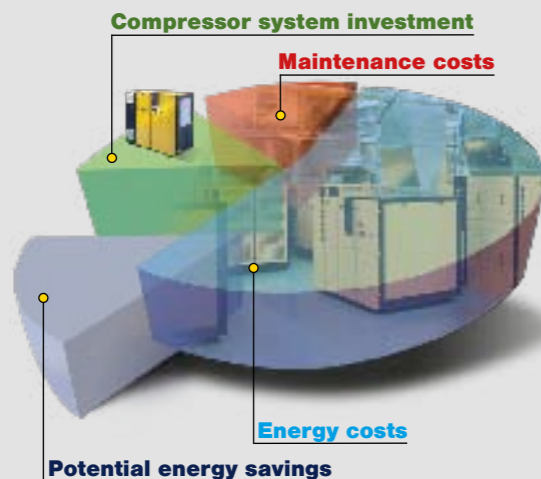
As a user, you expect maximum efficiency, reliability and consistent air quality from your compressed air system. That may sound simple, but these advantages are influenced by many different factors:

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

Efficient energy consumption therefore plays a vital role in

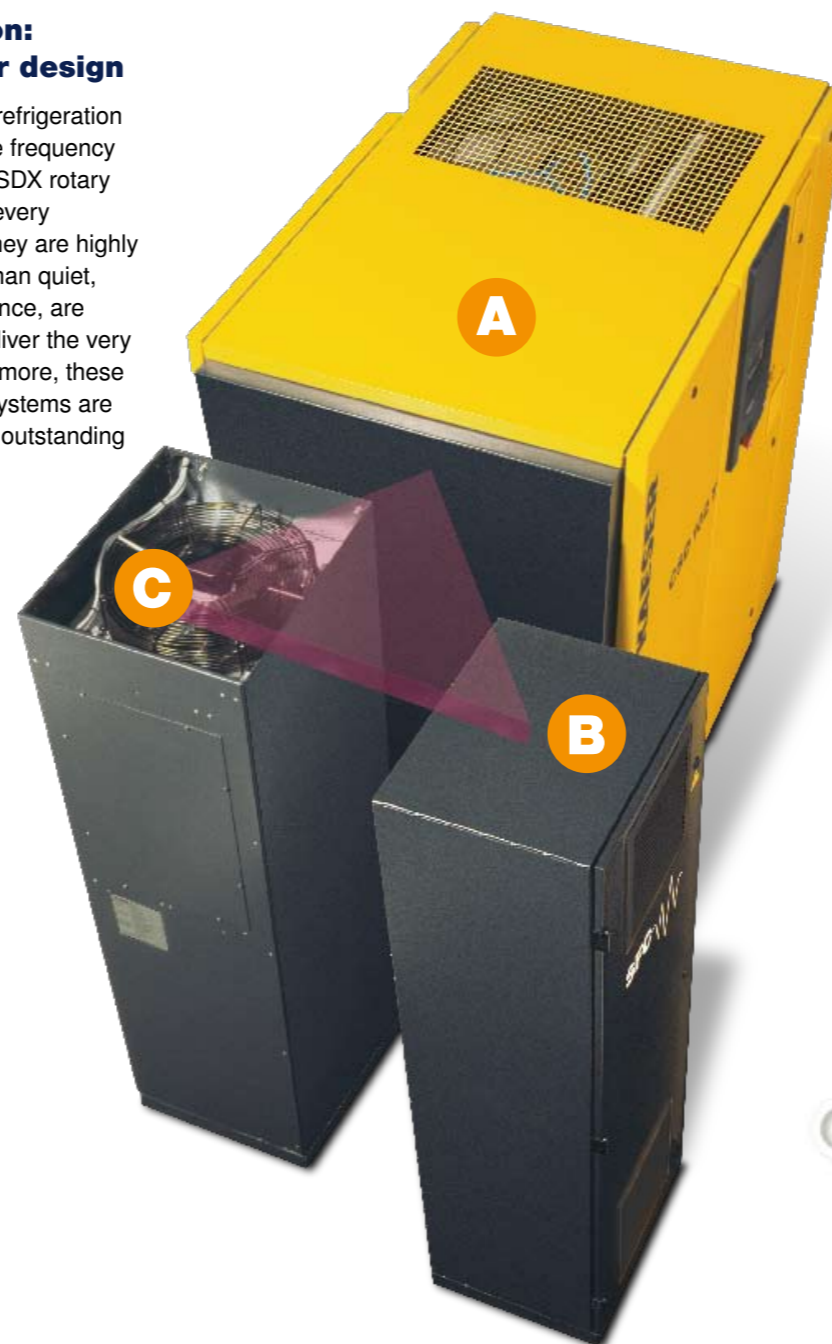
every compressed air system, as does compressor reliability. In addition, the compressed air should be free from condensate and treated to provide the required level of quality appropriate for the specific application.

These measures ensure enhanced system reliability and significantly reduce maintenance costs in the air distribution network, pneumatic controls and all other associated compressed air powered equipment.



KAESER's solution: Versatile modular design

Available with a modular refrigeration dryer and/or SFC variable frequency drive, BSD-, CSD- and CSDX rotary screw compressors fulfil every customer requirement: They are highly energy efficient, quieter than quiet, require minimal maintenance, are extremely reliable and deliver the very best in air quality. Furthermore, these turnkey compressed air systems are simple to install and offer outstanding versatility.



BSD, CSD and CSDX— Efficiency as standard

The new BSD, CSD and CSDX series compressors with energy saving 1:1 drive form the basis for KAESER's versatile modular concept. They are particularly efficient, durable and reliable, as each is equipped a generously-sized low-speed airend featuring SIGMA PROFILE rotors.



T — Refrigeration dryer

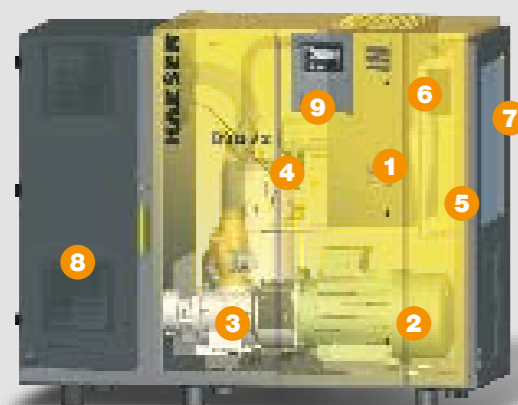
BSD, CSD and CSDX compressors can be supplied with an integrated refrigeration dryer module as required. The compressor and dryer are housed in separate cabinets with individual cooling air apertures to increase operational reliability.



SFC — Sigma Frequency Control

The SFC variable frequency drive module is available for all BSD, CSD and CSDX compressors. The SFC module and the compressor form a compact, hard-wired unit with a compact footprint and short

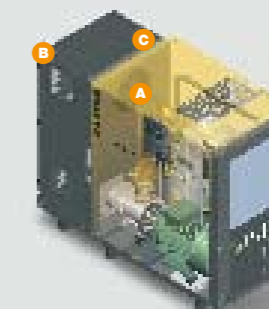
communication paths between the control electronics and drive motor. Each package is delivered tested and ready for operation.



- 1 Inlet valve
- 2 Electric motor
- 3 SIGMA PROFILE airend
- 4 Separator with cartridge
- 5 Fluid cooler
- 6 Fluid filter
- 7 Compressed air after-cooler
- 8 Control cabinet - SFC module
- 9 PC-based control system

Maximum Flexibility

KAESER's versatile range of modular T SFC packages ensures that a model is available to suit every compressed air need. The refrigeration dryer module C transforms a standard rotary screw compressor into a compact compressed air system that delivers quality dried-air in accordance with the highest standards. With the addition of the SFC module B, the compressor speed can be automatically adjusted to meet varying air demand. All possible combinations of these three modules are available.

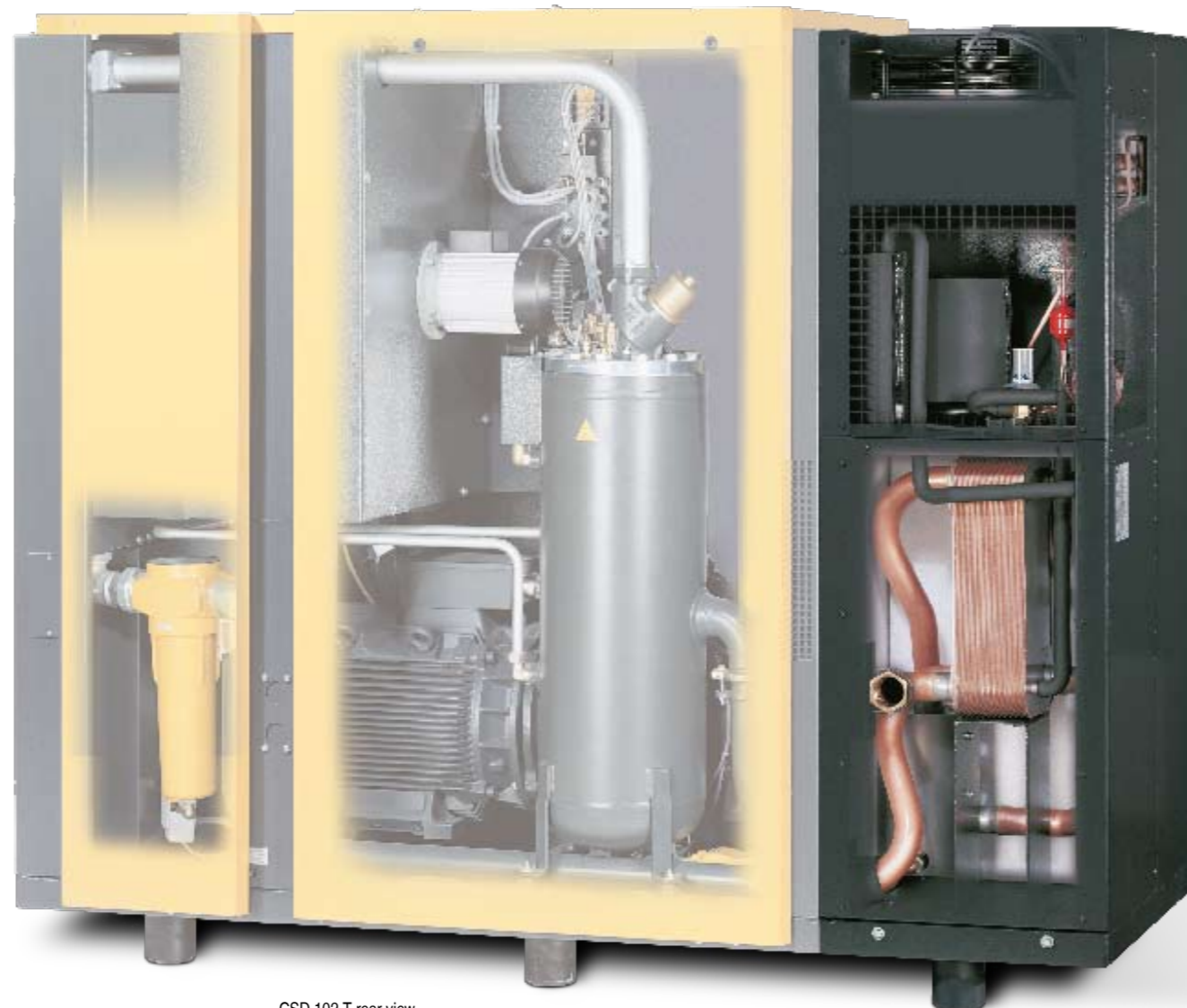


- A = BSD, CSD or CSDX rotary screw compressor
- B = SFC
- C = Refrigeration dryer (T)

BSD T – CSDX T with Compact Refrigeration Dryer

Innovative: The BSD T, CSD T and CSDX T

The new BSD T, CSD T and CSDX T rotary screw compressor packages meet every customer requirement, as they combine maximum reliability with outstanding efficiency. With the addition of the integrated refrigeration dryer module, these high-performance units are transformed into complete air supply systems. Easy to maintain, the dryer is contained in its own separate housing within the unit to prevent exposure to heat from the compressor package, considerably increasing operational reliability and enabling use in ambient operating conditions of up to +45 °C.



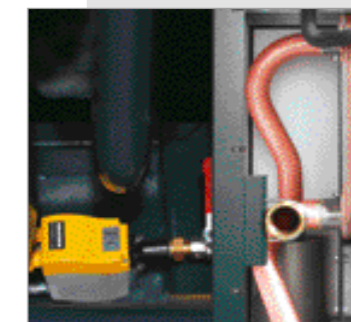
CSD 102 T rear view

Thermal insulation is omitted from the illustration



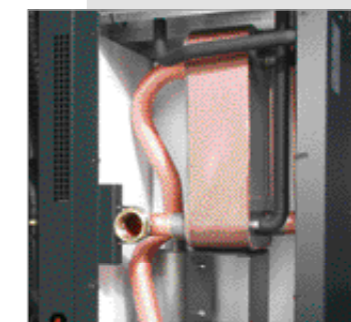
Dependable centrifugal separator

A centrifugal separator with an electronically controlled ECO DRAIN is installed between the compressor and the dryer. This ensures safe, efficient initial separation and drainage of the condensate even under conditions of high ambient temperature and humidity.



Refrigeration dryer with ECO DRAIN

The refrigeration dryer also features an ECO DRAIN. The advanced level-controlled condensate drain eliminates the compressed air losses associated with solenoid valve control. This both saves energy and considerably enhances the reliability of the compressed air supply.



Stainless steel plate heat exchanger

The dryer's stainless steel plate heat exchanger is both corrosion- and contamination-resistant. Even with fluctuating airflow, the separate stainless steel condensate separator reliably removes the accumulating condensate from the air. The dryer's components and piping are

designed to provide exceptional operational safety and reliability.

Turnkey operation

The integrated refrigeration dryer module is directly attached to the standard unit and is ready for immediate use. The modular design allows the components in the dryer to be generously sized and easily accessible for maintenance. It also prevents exposure of the refrigeration dryer to any heat from the compressor package. The high performance cooling system ensures reliable air package operation up to an ambient temperature of +45 °C and significantly increases compressed air availability.



SIGMA CONTROL

The SIGMA CONTROL compressor controller constantly monitors the compressor, refrigeration dryer and condensate drains. If required, signals from the dryer can be defined as alarms and forwarded to a centralised control centre.

SFC — Ultimate Efficiency

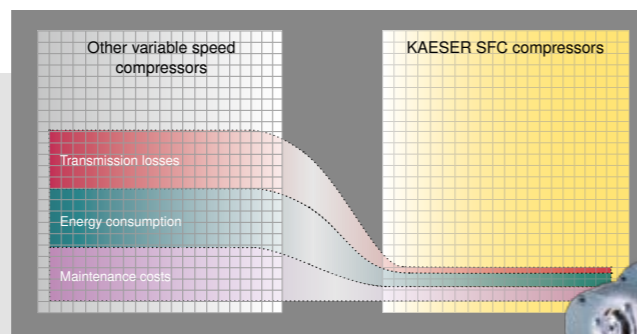
Maximum flexibility: The BSD SFC, CSD SFC and CSDX SFC series

Every KAESER rotary screw compressor is equipped with a large, efficient airend featuring high performance SIGMA PROFILE rotors. The airends in BSD, CSD and CSDX units are powered by a direct drive system that eliminates the transmission losses associated with gear drive systems, enabling these compressors to provide significant energy savings.

Considerable savings can also be achieved with the addition of a SIGMA FREQUENCY CONTROL (SFC) module. Depending on the size of the compressor installation, energy consumption in larger compressed air systems can be reduced by up to 50 %.

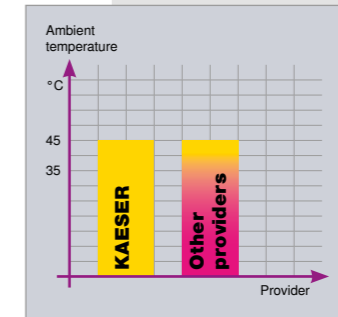


CSDX 162 T SFC front view



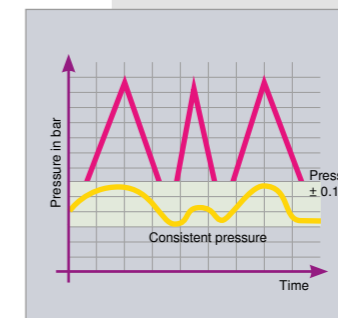
BSD SFC, CSD SFC and CSDX SFC compressor packages are highly efficient direct drive units featuring variable speed control. With high efficiency performance throughout the entire control range, large, low speed airends featuring the energy saving SIGMA Profile have significant advantages over smaller, high speed airends.

Zero Interference:
The electromagnetic compatibility (EMC) of the components and of the complete machine has been tested and certified in accordance with all applicable regulations.



Perfect performance – even with high ambient temperatures

The generously-sized SFC module with its efficiently cooled control cabinet allows trouble-free operation in ambient temperatures up to +45 °C.

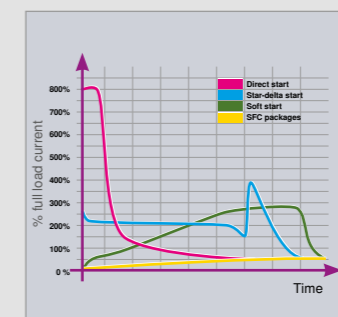


Consistent pressure

Air delivery from a BSD SFC, CSD SFC or CSDX SFC compressor can be matched to actual air demand according to required system pressure, by continuously adjusting drive motor speed (and therefore the airend) within its specified control range. Depending on the buffer capacity of the downstream air network, it is therefore possible to precisely maintain working pressure to

within ± 0.1 bar and, as a result, to reduce maximum system pressure. This can lead to significant savings, as each 1 bar reduction in pressure amounts to a 7 percent reduction in energy consumption.

All packages are designed to operate at full load, 7 days a week, yet require no additional maintenance. **Triple savings with 1:1 drive:** Significantly increasing reliability and service life, **direct drive** reduces the number of components needed in comparison with gear drive and eliminates the associated transmission losses. Sound levels are also considerably lower. The **benefits** speak for themselves: **efficient power transmission, optimal power consumption and reduced servicing / downtime costs.**



Soft start with no current spikes

Soft start allows a gradual increase in drive motor current from zero to full load, enabling almost unlimited motor switching frequency i.e. the number of times the motor can be switched on within a defined time period without overheating. Current spikes that can potentially cause

damage to power systems and equipment are reliably eliminated without the need for additional expensive electronics. In addition, the continuously variable acceleration and deceleration of moving parts reduces dynamic loading.

BSD/CSD/CSDX T SFC – Eight Decisive Advantages



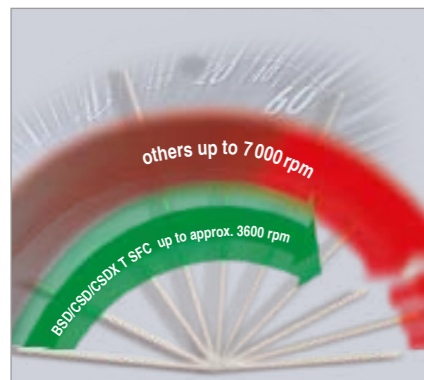
1 SIGMA PROFILE air end

A specific drive power can be used to turn a smaller air end at high speed or a larger air end at slow speed. Larger, low speed air ends are more efficient, delivering more compressed air for the same drive power. That is why KAESER developed air ends especially for the BSD, CSD and CSDX series that precisely match the individual drive power and motor speed of each machine in the range. The slightly higher investment cost of the larger air end is quickly recovered by the energy saved during operation.



2 Energy-saving 1:1 drive

The advantages of this drive system are not just limited to the elimination of transmission losses. The motor and air end are joined by the coupling and its housing to form a compact and durable unit that, apart from greasing of the motor bearings, requires no regular maintenance. Should the coupling ever need to be replaced, it takes just a few minutes without any disassembly of the unit, as the opening in the housing is more than large enough to replace the two coupling sections.



3 Low speed operation

Each BSD SFC, CSD SFC and CSDX SFC compressor has exactly the same mechanical components as those used in KAESER's fixed speed compressors. This not only ensures unrivalled reliability and compressed air availability, but also guarantees optimum energy efficiency. The most efficient method of producing compressed air is by using large, low speed air ends – air ends in BSD/CSD/CSDX SFC compressors have a typical maximum rotation speed of approximately 3600 rpm. Further advantages include long service life and reduced maintenance requirement. The use of standardised drive motors also contributes to long-term compressed air availability.

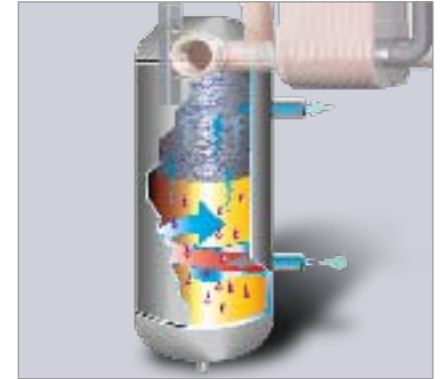


4 SIGMA CONTROL

Based on robust PC architecture, the SIGMA Control offers the possibility of Dual, Quadro, Vario and Continuous control. Clearly marked navigation and input keys on the user interface are used to move around within the menu options of the four line alpha-numeric display. This powerful compressor controller can also display information in any 1 of 30 selectable languages at just the press of a button. The SIGMA CONTROL automatically controls and monitors the compressor package. The Profibus interface enables exchange of data and operational parameters allowing the SIGMA Control to communicate with other air management systems such as the SIGMA Air Manager. Interfaces are provided as standard for connection of a modem, a second compressor in base-load sequencing mode and for connection to data networks (Profibus DP).

5 Efficient stainless steel condensate separator

The separator tank in the refrigeration dryer is made of stainless steel and is therefore completely corrosion resistant. A deflector plate forces the compressed air that streams into the separator into circular motion. The air then flows through a stainless steel wire mesh that ensures 99.9% water separation from the air. This figure remains almost constant – even with fluctuating airflow – reliably maintaining the required pressure dew point. Solid particles are also washed out and eliminated together with the condensate.



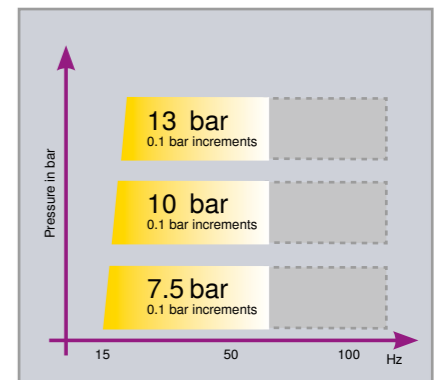
6 SFC module

Siemens frequency converters are used exclusively in KAESER's speed controlled compressors for several reasons: Siemens manufactures the industrial PC-based SIGMA CONTROL compressor controller, which enables seamless communication with the SFC control cabinet. Furthermore, the worldwide presence of Siemens ensures dependable service. The SFC control cabinet and SIGMA CONTROL are Class 1 tested and certified as per electromagnetic compatibility regulation EN 55011, both as individual components and as an integrated system.



7 Flexible pressure adjustment

The wide range of available 1:1 drive air ends makes it possible to select the one that works most efficiently within the pressure and performance range required. This ensures that every BSD/CSD/CSDX SFC compressor operates with the most efficient pressure-frequency profile. The SIGMA CONTROL compressor controller is equipped with a pressure-to-frequency profile that guarantees maximum flexibility for air delivery and pressure whilst providing best possible efficiency.



8 Specific power is the key

Large, low speed air ends are more efficient than small high speed air ends because they supply more air for the same drive power. This is not just the case at full load, but also applies throughout the entire control range, which is particularly important for variable speed machines. The specific energy requirement of 6.4 kW per m³/min for a KAESER SFC compressor operating at 7.5 bar can be considered as an excellent indication of the machine's efficiency. Variable frequency controlled compressors are only truly efficient if they have low energy consumption throughout their entire control range.



Equipment

Complete unit

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

Sound insulation

Panels lined with laminated mineral wool.

Vibration damping

Dual anti-vibration mountings using rubber bonded metal elements.

Airend



Genuine KAESER rotary screw, single stage airend with SIGMA PROFILE and cooling fluid injection for optimised rotor cooling.

Drive

Direct, high-flex coupling, without gearing.

Electric motor

Premium efficiency electric motor of quality German manufacture to IP 55 and Insulation Class F for additional reserve.

Connection from motor to airend

Airend with integral coupling flange.

Electrical components



Control cabinet to IP 54, control transformer, Siemens Masterdrive with control unit, volt-free contacts for ventilation control.

Fluid and air flow

Dry-air filter, pneumatic inlet and venting valves, AD 2000-compliant fluid reservoir with three-stage



separator system, pressure relief valve, minimum pressure / check valve, thermostatic valve and micro-filter, all fully piped using flexible couplings.

Cooling

Air cooled; separate aluminium coolers for compressed air and fluid, radial fan driven by its own motor.

Refrigeration dryer

CFC-free, R 134a refrigerant, fully insulated, hermetically sealed refrigerant circuit, hot-gas bypass control, electronic condensate drain and upstream centrifugal separator.

SIGMA CONTROL

Interfaces for data communication comprising: RS 232 for a modem, RS 485 for a slave compressor in base load sequencing mode (not with SFC models), Profibus DP interface for data networks. Prepared for Teleservice.



Ergonomic control panel

Red, yellow and green LEDs show the operational state of the machine at a glance. Also features a four-line plain

text display, 30 selectable languages, touch keys with icons and a duty cycle indicator.

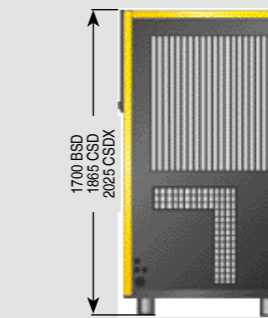
Prime functions

Fully automatic monitoring and regulation of airend discharge temperature; monitoring of motor current, direction of airend rotation, air filter, fluid filter and fluid separator cartridge; display of performance data, service intervals of primary components, operating hours, status data and event memory data. Selection of Dual, Quadro, Vario and Continuous control modes as required.

(For further information refer to SIGMA CONTROL/ SIGMA CONTROL BASIC brochure P-780)



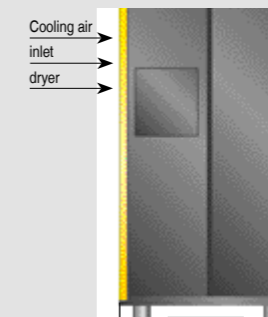
Dimensions



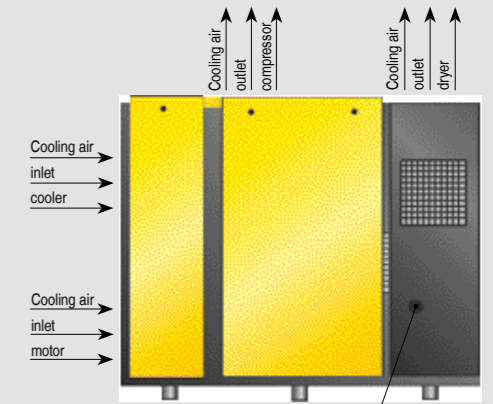
View from right



Front view



View from left



Rear view

Technical Specifications - BSD/CSD/CSDX T SFC

T - Version with integrated refrigeration dryer (refrigerant R134 a)

SFC - Version with variable speed drive

T SFC - Version with variable speed drive and integrated refrigeration dryer

Rated motor power	Model	Max. working pressure	FAD *)	Max. operating pressure	Dryer power consumption	Sound level **)	Weight
kW		bar	m³/min	bar	kW	dB(A)	kg
30	BSD 62 T	7.5	5.65	8			
		10	4.45	11	0.8	68	1200
		13	3.60	15			
37	BSD 72 T	7.5	7.00	8			
		10	5.60	11	0.8	68	1245
		13	4.40	15			
45	BSD 81 T	7.5	8.15	8			
		10	6.80	11	1.1	70	1350
		13	5.43	15			
45	CSD 82 T	7.5	8.25	8			
		10	6.90	11	1.1	69	1460
		13	5.50	15			
55	CSD 102 T	7.5	10.20	8			
		10	8.20	11	1.1	69	1510
		13	6.75	15			
75	CSD 122 T	7.5	12.00	8			
		10	10.05	11	1.4	71	1540
		13	8.07	15			
75	CSDX 137 T	7.5	13.70	8			
		10	11.86	11	2.2	72	2250
		13	9.88	15			
90	CSDX 162 T	7.5	16.10	8			
		10	13.50	11	2.2	73	2350
		13	11.70	15			

Model	Max. working pressure	FAD *)	Pressure range	Sound level **)	Weight
	bar	m³/min	bar	dB(A)	kg
BSD 72 SFC	7.5	1.57 - 6.25	6 - 8.5		
	10	1.16 - 5.34	9 - 11	70	1220
	13	0.87 - 4.45	12 - 15		
CSD 82 SFC	7.5	1.92 - 8.20	6 - 8.5		
	10	1.49 - 6.90	9 - 11	71	1350
	13	1.10 - 5.80	12 - 15		
CSD 102 SFC	7.5	2.33 - 9.90	6 - 8.5		
	10	1.87 - 8.95	9 - 11	71	1560
	13	1.40 - 7.30	12 - 15		
CSD 122 SFC	7.5	2.89 - 12.28	6 - 8.5		
	10	2.18 - 10.50	9 - 11	73	1610
	13	1.86 - 8.90	12 - 15		
CSDX 137 SFC	7.5	3.39 - 13.25	6 - 8.5		
	10	2.82 - 11.30	9 - 11	74	2200
	13	2.12 - 9.60	12 - 15		
CSDX 162 SFC	7.5	3.93 - 15.85	6 - 8.5		
	10	3.36 - 14.03	9 - 11	75	2400
	13	2.60 - 12.00	12 - 15		

Model	Max. working pressure	FAD *)	Pressure range	Dryer power consumption	Sound level **)	Weight	Dimensions
	bar	m³/min	bar	kW	dB(A)	kg	W x D x H mm
BSD 72 T SFC	7.5	1.57 - 6.25	6 - 8.5				2080 x 1005 x 1700
	10	1.16 - 5.34	9 - 11	0.8	70	1340	2080 x 1005 x 1700
	13	0.87 - 4.45	12 - 15				2080 x 1005 x 1700
CSD 82 T SFC	7.5	1.92 - 8.20	6 - 8.5				2080 x 1005 x 1700
	10	1.49 - 6.90	9 - 11	1.1	71	1580	2200 x 1041 x 1856
	13	1.10 - 5.80	12 - 15				2200 x 1041 x 1856
CSD 102 T SFC	7.5	2.33 - 9.90	6 - 8.5				2200 x 1041 x 1856
	10	1.87 - 8.95	9 - 11	1.1	71	1700	2200 x 1041 x 1856
	13	1.40 - 7.30	12 - 15				2200 x 1041 x 1856
CSD 122 T SFC	7.5	2.89 - 12.28	6 - 8.5				2200 x 1041 x 1856
	10	2.18 - 10.50	9 - 11	1.4	73	1770	2200 x 1041 x 1856
	13	1.86 - 8.90	12 - 15				2200 x 1041 x 1856
CSDX 137 T SFC	7.5	3.39 - 13.25	6 - 8.5				2600 x 1285 x 2025
	10	2.82 - 11.30	9 - 11	2.2	74	2400	2600 x 1285 x 2025
	13	2.12 - 9.60	12 - 15				2600 x 1285 x 2025
CSDX 162 T SFC	7.5	3.93 - 15.85	6 - 8.5				2600 x 1285 x 2025
	10	3.36 - 14.03	9 - 11	2.2	75	2600	2600 x 1285 x 2025
	13	2.60 - 12.00	12 - 15				2600 x 1285 x 2025



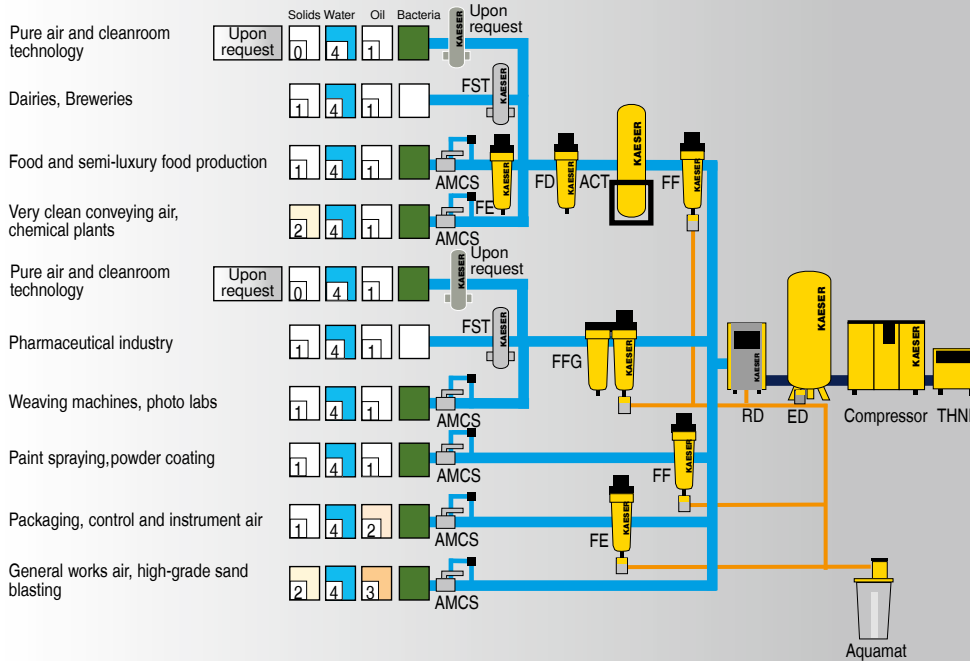
3D-view

*) FAD to ISO 1217: 1996, Annex C; **) Sound level to PN8NTC 2.3 at 1 m distance, free-field measurement

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 ¹⁾



Explanation:

- THNF = Bag filter**
Cleans dusty and heavilycontaminated intake air
- ZK = Centrifugal separator**
Separates accumulating condensate
- ED = ECO-DRAIN**
Electronic level-controlled condensate drain
- FB = Pre-filter 3 µm**
- FC = Pre-filter 1 µm**
- FD = Particulate filter 1 µm (attrition)**
- FE = Micro-filter 0.01 ppm**
Separates aerosol oil and solid particles
- FF = Micro-filter 0.001 ppm**
Separates aerosol oil and solid particles
- FG = Activated carbon filter**
For adsorption of oil vapours
- FFG = Activated carbon and micro-filter combination**
- RD = Refrigeration dryer**
For drying compressed air, pressure dew point to +3 °C
- DD = Desiccant dryer**
For drying compressed air, pressure dew point to -70 °C
- ACT = Activated carbon adsorber**
For adsorption of oil vapours
- FST = Sterile filter**
For sterile compressed air
- Aquamat = Condensate treatment system**
- AMCS = Air-main charging system**

Degree of filtration:

Class ISO 8573-1	Solid particles ¹⁾		Humidity	Total oil content
	Max. particle size µm	Max. particle concentration mg/m ³	Pressure dew point (x= liquid water in g/m ³)	mg/m ³
0	e.g. Consult KAESER regarding pure air and cleanroom technology			
1	0.1	0.1	≤ - 70	≤ 0.01
2	1	1	≤ - 40	≤ 0.1
3	5	5	≤ - 20	≤ 1
4	15	8	≤ + 3	≤ 5
5	40	10	≤ + 7	-
6	-	-	≤ + 10	-
7	-	-	x ≤ 0.5	-
8	-	-	0.5 < x ≤ 5	-
9	-	-	5 < x ≤ 10	-

Contaminants:

+	Solids	-
+	Water/Condensate	-
+	Oil	-
+	Bacteria	-

¹⁾ As per ISO 8573-1:1991 (The specification for particle content is not measured as per ISO 8573-1:2001, as the limits defined there in for Class 1 are to be applied to 'Clean Rooms')
²⁾ As per ISO 8573-1:2001