

# Sigma Frequency Control

## SFC Series 75 to 250

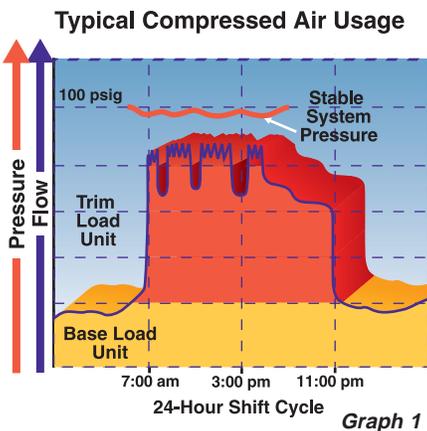
Capacities: from 125 to 1568 cfm

Pressures: from 80 to 217 psig



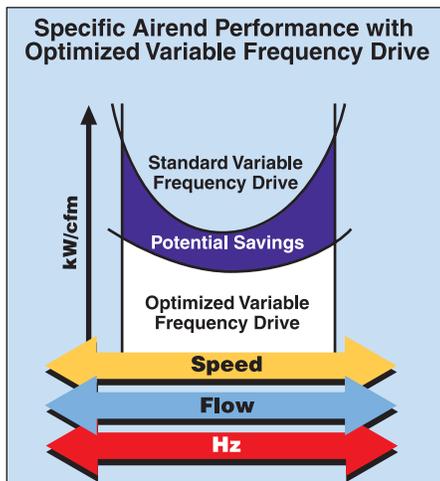
# Variable Speed Technology from Kaeser

Kaeser Sigma Frequency Control combines Siemens drive technology with our proprietary Sigma Profile airend. Our engineers have optimized airend design to accommodate a wide flow range with unmatched efficiency. Drive motor and airend operate at low rotational speeds resulting in exceptional reliability and long life.



## Analysis Reveals Potential

The advantages of variable frequency drives are obvious: adapt output requirements to various demands while optimizing energy consumption. However, only a thorough air system



analysis can obtain the necessary information to optimize system performance. With Kaeser Air Demand Analysis (ADA), the three most critical data points can be analyzed: compressed air demand over time, actual system pressure vs. required system pressure over time, and air purity requirements. Air Demand Analyzers, which are hooked up to an existing compressor system, provide an efficient and accurate picture of the application. In order to fully benefit from the Sigma Frequency Control (SFC) technology, it is important to realize that each application is different and has to be treated accordingly. As graph 1 illustrates, the fluctuating air demand profile of a typical system calls for an individual solution.

## Integrated System Design

Even though variable frequency drive compressors can have an effective flow range of 20 to 100%, the efficiency (kW/cfm) is not constant over the whole speed range. The best efficiency is normally between 40 and 85%. As graph 2 illustrates, the Sigma Profile airend has a clear efficiency advantage over a wider flow range than its competition.

## Retrofitting existing compressors

Not all compressors are suited to be retrofitted. The drive motor's cooling requirements and torque output must be adequate at lower and higher frequencies (motor rpm). Kaeser's optimized Sigma Profile airend is designed to efficiently handle the required airend speed (tip speed) range, other airends may not.



### 1 Sigma Profile Airend

Optimized for variable speed operation, Sigma Profile airends provide exceptional efficiency over a wide range of flows. See graph 2.



### 2 SFC Drive

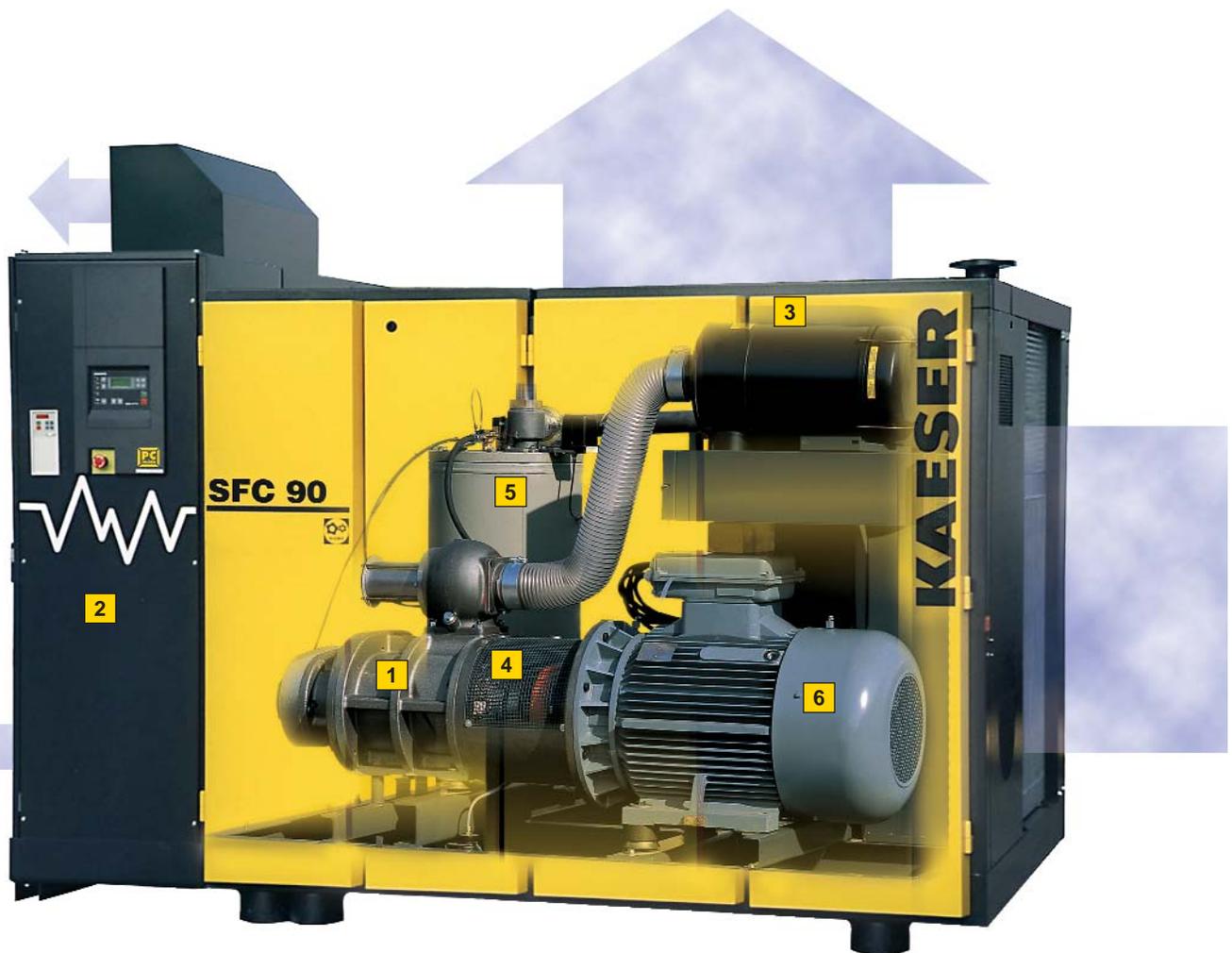
Drive System Technology from Siemens provides superior reliability and drive efficiency. Kaeser SFC drive includes EMI filters, contactor for galvanic separation and a line reactor providing superior protection. Drive cabinet cooling fans ensure proper operating temperature.

### 3 Radial Fan(s)

A powerful radial fan draws cool ambient air through the coolers. It is designed to provide higher static pressure which is ideally suited for ducting and heat recovery applications.



The radial fan is extremely quiet and consumes less power than conventional axial fans providing additional energy savings. The SFC 200 and SFC 250 have two thermostatically controlled radial fans.

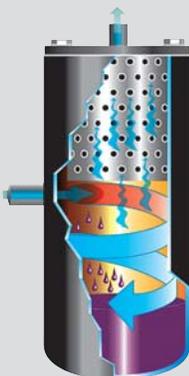


#### 4 One-to-One Drive

Some compressors are called direct drive but are really gear driven units. In Kaeser's SFC package, the motor is directly connected to the airend with a maintenance-free coupling, providing maximum transmission efficiency. The airend and motor are connected by a casting which is doweled and pinned to assure perfect alignment.



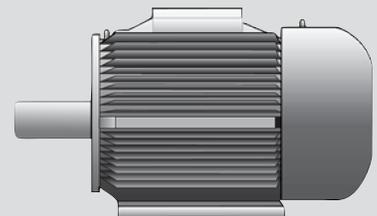
#### 5 Efficient Separator System



SFC packages are fitted with a redesigned, high-efficiency separator system. Most of the cooling fluid is initially separated from the air by centrifugal force in the separator tank. Any remaining fluid is separated by a 2-stage filter in the separator cartridge. This triple action doubles the cartridge service life and reduces fluid carry over to 2 ppm or less. The separator lid swings out for easy maintenance.

#### 6 Motor

TEFC, high efficiency, 460 V, 3-phase, 60 Hz, 1800 rpm, class F insulation, and EPC compliant. Other voltages are available. Remote grease fittings make maintenance a breeze.



## Superior Starting Features

Power companies and customers alike appreciate the unique features of Kaeser SFC. With unlimited motor starts, the lowest inrush current available, and input kW precisely matched to air demand, this unit provides cost savings that directly impact the bottom line. Plus, the SFC drive yields a “near unity power factor” which eliminates power factor penalties and the need for power factor correction capacitors.

## Precise Pressure Control

Highly accurate sensors provide operational data to the Sigma Control system. Combined with the responsive SFC Drive system, pressure is controlled precisely to  $\pm 2$  psig. Wasteful air and power consumption caused by “over pressurizing” the compressed air system is avoided. In addition, stable system pressure increases productivity and results in higher quality.

## Extremely Quiet

While the low noise radial fan(s) and the one-to-one drive considerably

reduce noise levels, the new “split cooling air flow” design provides superior sound proofing without cooling efficiency losses. As a result, the SFC series is about 10 dB(A) quieter than conventional compressors of equal performance with noise emissions as low as 69 dB(A) under any operating conditions.

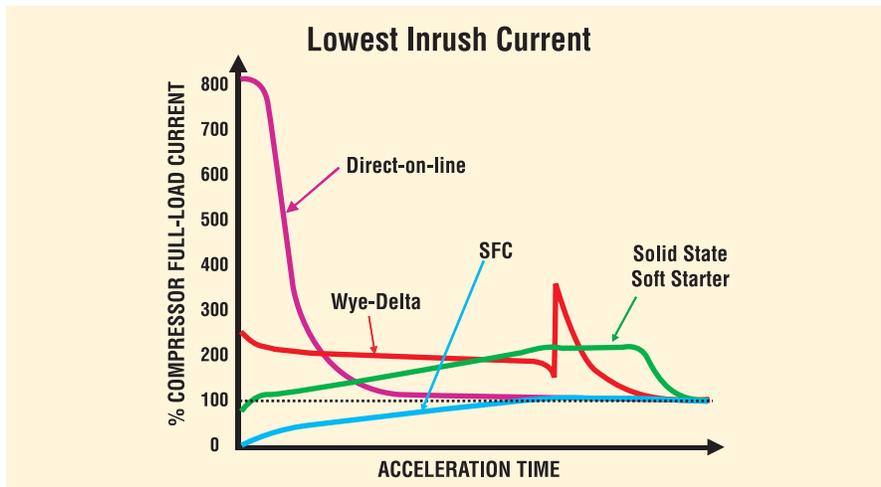
## Unique Air Flow Design

To increase operational reliability and reduce maintenance costs, the cooler is conveniently located on the outside of the unit. Therefore, dust and dirt

build-up is easily monitored, accessed, and removed without dismantling the cooler.

## Optimized Cooling

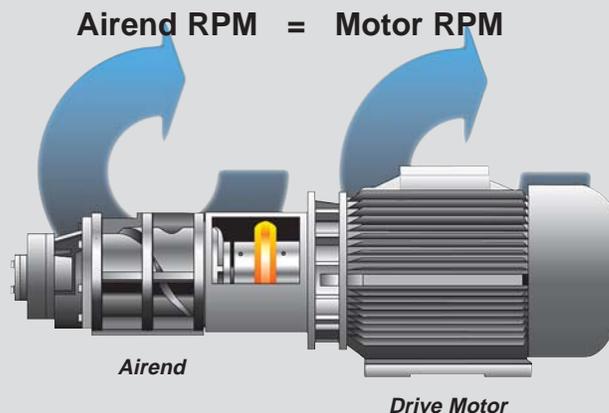
Cooling air for the motor is also drawn directly from ambient air. The radial fan removes the heated air and effectively cools the motor even under unfavorable operating conditions. This additional cooling air is drawn in and exhausted upwards.



## Optimized Efficiency

In SFC packages, one-to-one drive reduces the number of components needed compared to a gear drive unit thus increasing reliability and service life.

Kaeser has selected oversized airends specifically matched to produce the required output in flow and pressure. Compared to compressors using small, high speed gear-driven airends, the SFC one-to-one drive provides triple savings: efficient power transmission, improved power consumption, and reduced maintenance and related downtime costs.



# Standard Equipment

## Compressor

Single stage, flooded rotary screw airend with the power-saving, proprietary Sigma Profile. The airend maintains its efficiency over a wide flow range.

## SFC Drive System

- TEFC motor, high efficiency, 460 V, 3-phase, 60 Hz, 1800 rpm, class F insulation, 1.15 service factor, and EPA compliant.
- PTC motor protection
- Siemens AG frequency converter
- Magnetic contactor between power and drive (galvanic separation)
- Pulse width modulation and IGBT Technology
- Soft start for unlimited motor starts
- Power factor correction to near unity
- Incoming AC line reactor
- EMI (electromagnetic interference) filter
- Pressure transducer controlled to +/-2 psig
- Constant torque

## Sigma Control System

Sigma Control is a modern, compact, PC-based control system with Intel™ processor and real-time operating system. Sigma Control monitors all critical compressor and control system functions and compressor maintenance items. History memory offers easy trouble shooting and record keeping. Integrated database with plain text display in up to 20 languages. Sigma Control has three communication ports built in (RS 232, RS 485, Profibus) with open architecture for communication and integration into master control systems.

## Protective Devices

Sigma Control System provides low temperature lock-out, and fluid temperature rise gradient monitoring. Safety pressure relief valve, emergency stop button and fluid Level indicator are also included.

## Compressor Control

The Sigma Control, combined with the SFC drive system, efficiently adjusts compressed air output to fluctuating requirements. System pressure is maintained  $\pm 2$  psig by reducing or increasing airend speed in a wide flow range without sacrificing efficiency. If the air demand falls below the minimum flow output, the compressor idles for a minimal period of time before it shuts down. The compressor starts up automatically if the pressure drops below a predetermined level.

## Air/Coolant System

The cooling air enters the package through the cooling fluid and air coolers. The compressor intake air is taken from the outside and passes through a two-stage 4 micron air intake filter with cyclone pre-separation, and a replaceable, cleanable cartridge extends fluid drain intervals and airend life. Includes:

- Pneumatic inlet and vent valve.
- Combined reservoir and separator tank with 3-stage separation system ensures minimal fluid carry over of 2 ppm (by weight). Quick change devices on the separator and cooler allow complete, fast, and easy fluid changes.
- ASME separator tank is equipped with quick disconnect fittings for manual verification of separator element contamination.
- A thermostatically controlled valve ensures perfect regulation of the fluid temperature.
- The micro fluid filter utilizes a spin-on cartridge.

- Main fluid and compressed air lines are made of rigid pipe and incorporate flexible pipe connections.
- Standard units are air cooled with high efficiency air and fluid cooler. Optional water cooling is available.
- Radial cooling fan(s) provides intensive cooling for reliable condensate removal and high static pressure for easy ducting.
- Moisture separator with Eco-Drain.

## Enclosure

Compact unit is super sound-proofed by a sheet metal enclosure with mineral wool and plastic liners. Enclosure features a durable powder coated finish. Compressor is mounted on solid base frame with a solid steel floor and anti-vibration mounts. Additional vibration isolation for airend, motor, and separator tank is standard. Unit is very maintenance friendly with easy access to all important components through wide-opening access doors and removable cabinet panels with key locks.

## Devices for Easy Maintenance

Fluid change pressurization valve complete with drain hose; gasketed and hinged doors on the front with slotted key locking lugs; removable rear and side panels and easily accessible drive motor grease fittings.

## Options

Water cooled models are available.

## Accessories

A comprehensive range of clean air treatment products, including dryers, filters, separators, and air receivers are available.

# Technical Specifications

Model	Motor		Pressure <sup>(1)</sup> (psig)	Capacity <sup>(2)</sup> (cfm)		Dimensions L x W x H (in.)	Weight <sup>(3)</sup> (lb.)	Noise Level <sup>(4)</sup> (dB(A))
	(hp)	(kW)		Min	Max			
SFC 75	100	75	110	132	517	111¼ x 76 x 89½	7000	69
			125	132	515			
			145	125	446			
SFC 90	125	90	110	132	566	111¼ x 76 x 89½	7230	70
			125	132	564			
			145	125	509			
SFC 110	150	110	110	151	692	111¼ x 76 x 89½	7570	71
			125	150	689			
			145	141	622			
SFC 132	180	132	110	213	812	111¼ x 76 x 89½	7880	72
			125	212	810			
			145	209	733			
SFC 160	215	160	110	213	1001	111¼ x 76 x 89½	9259	79
			125	212	997			
			145	209	880			
SFC 200	270	200	110	298	1222	129¼ x 84½ x 103½	12,790	76
			125	297	1158			
			145	228	1024			
SFC 250	335	250	110	360	1430	129¼ x 84½ x 103½	13,660	79
			125	357	1338			
			145	300	1285			

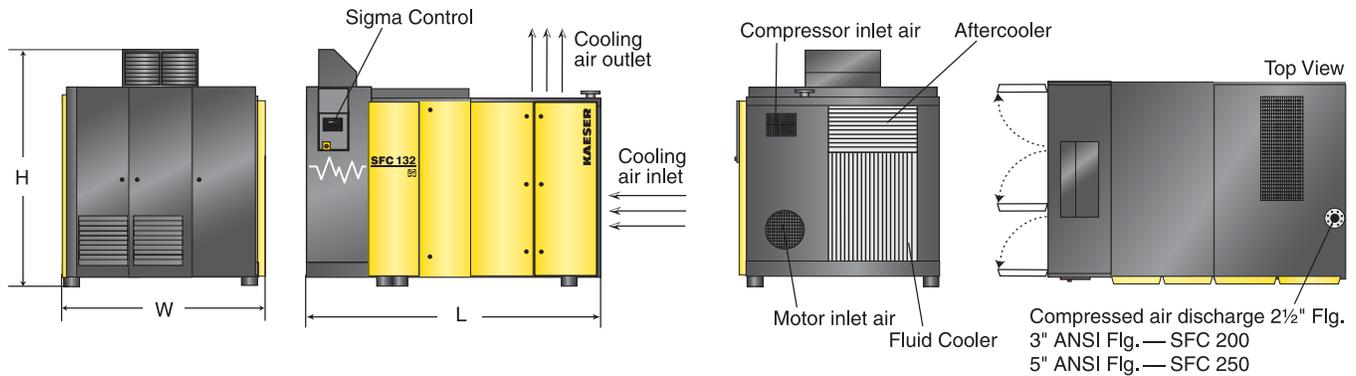
(1) Other pressures available

(3) Weights may vary slightly depending on airend model

*Specifications are subject to change without notice.*

(2) Performance rated in accordance with CAGI/PNEUROP PN2CPTC2 test code.

(4) Measured at 3 feet according to CAGI



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## The Air Systems Specialist

With over 80 years of experience, Kaeser is the air systems specialist. Our extensive 100,000 square foot facility allows us to provide unequalled product availability. With service centers nationwide and our 24-hour emergency parts guarantee, Kaeser customers can rely on the best after-sales support in the industry. Kaeser stands committed to providing the highest quality air system for your specific compressed air needs.