

Compressed Air System Control

SIGMA AIR MANAGER

For Sequencing and Monitoring up to 16 Compressors



Why you need a system controller

Modern compressed air systems have a variety of requirements. In addition to specific pressure, flow, and air quality requirements, system reliability and minimized energy consumption are key considerations.

Many users operate compressed air systems fed by two or more compressors. Too often these compressors operate on their individual control signals and are not well integrated into a system. The results are excess wear from too much valve cycling and too many motor starts, as well as fluctuating pressure at points of use. Further, energy is wasted by running more machines than necessary and at higher pressures than needed. The most efficient way to run compressors is to keep them fully loaded when needed and completely off when not needed.

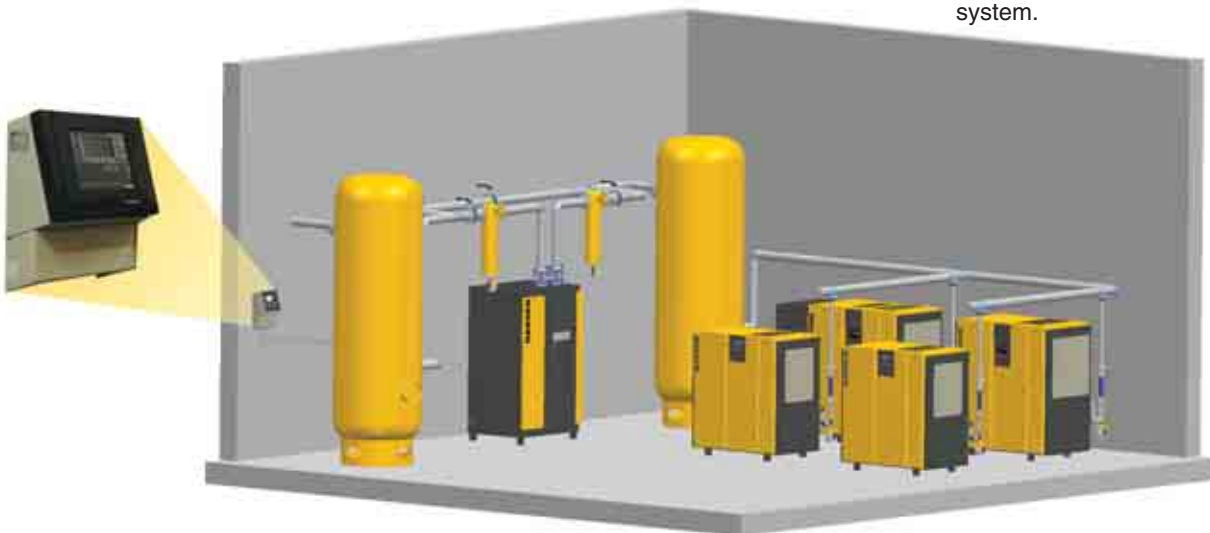
Users obtain far superior results when they control all compressors (or vacuum pumps or blowers) from a single control signal with a means to turn compressors on only when needed. This can be done without compromising pressure stability or system reliability. Further, this frequently allows operating at lower pressures that significantly reduce energy costs associated with leaks and artificial demand. Finally, a well-designed master controller balances compressor load hours for more effective maintenance scheduling.

Complete system control

The Sigma Air Manager (SAM) series combines Kaeser's decades of compressed air expertise with the latest industrial control technology to manage up to 16 compressors. More than just a simple sequencer that balances load hours among multiple machines, this air system controller provides a variety of tools to manage your air system in real time.

Sigma Air Manager uniquely provides energy-saving, demand-related pressure band control with a simple visualization of operational status for both system components and the compressed air system overall. SAM safely controls multiple units using the pressure band values, set point pressure, compressor grouping and compressor type.

Sigma Air Manager is the first compressed air system controller to combine the benefits of a modern industrial PC with Internet technology in a compressed air system. With SAM's unique intelligence and its communications capabilities, the entire compressed air system can be monitored and analyzed from any location as a stand alone network or part of a larger plant control system.



In this multiple compressor installation, SAM monitors the pressure in the dry tank downstream to provide optimum control for the entire system.

Sigma Air Manager

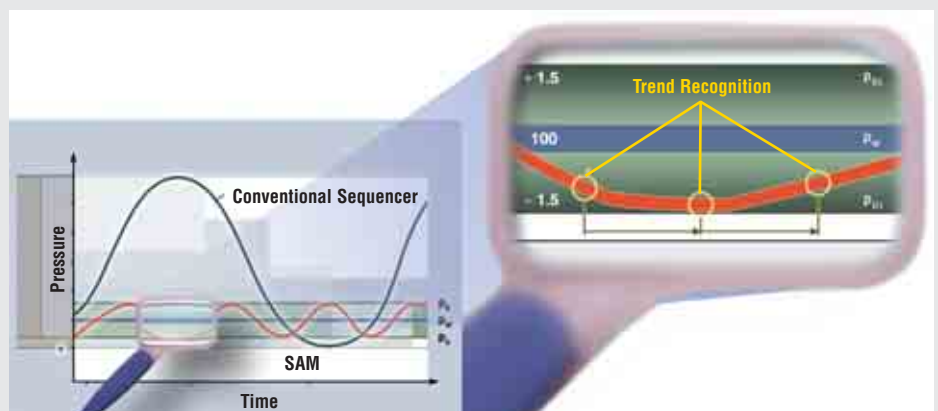


Features and benefits:

- Uses low switching differential to avoid unnecessary high operating pressures
- Selects the correct compressor to load based on air demand
- Minimizes starts and prevents simultaneous starts to reduce electrical costs
- Balances compressor service hours for better maintenance planning
- Provides comprehensive information on current system conditions
- Can be used to trend system dynamics
- Easily configured for remote monitoring
- Simple plain text menus are easy to navigate and understand
- Program changes can be made at any time to adapt to changes in system design or operating requirements
- Password protection prevents tampering
- Simple connections to compressors and accessories make installation easy

Intelligent trend recognition

Keeping the compressors working within a narrow pressure band (± 1.5 psi) and being able to recognize and accommodate demand trends is the ideal way to avoid higher than necessary operating pressure. Sigma Air Manager's computing capacity enables it to recognize these trends in air demand and optimize system performance by avoiding unnecessary loading of additional compressors. A highly accurate pressure transducer with sensitivity down to 0.145 psi makes it possible to do this without compromising pressure stability or over-pressurizing your system.



SAM controls pressure in a much tighter band than conventional sequencers.

Reduce Energy Costs

SAM can reduce the power consumption of any air system with up to sixteen compressors regardless of whether the individual machines are equipped with a modern internal controller such as Kaeser's Sigma Control or Sigma Control Basic, or an older, conventional controller. By optimizing the compressors' usage, application, and control systems, SAM provides significant energy savings potential. This makes SAM the ideal choice for modernizing medium to large air systems.

Energy-saving pressure band control

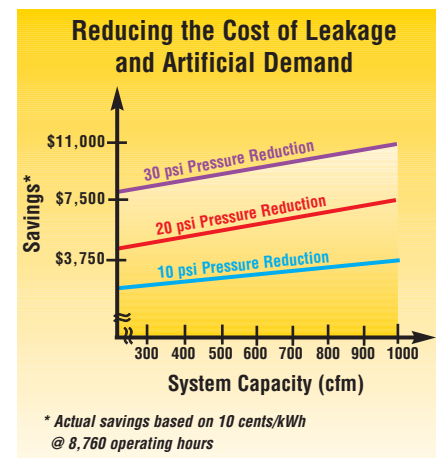
Simply applying precise pressure-band control can dramatically reduce power consumption without loss of performance. With the input from a single pressure transducer located down-

stream of the compressed air supply, SAM provides pressure band control for several sequenced compressors, while providing maximum energy savings. In contrast to the common cascade control or simple pressure bands, our pressure band control with integrated air demand trend analysis avoids unnecessarily high system pressure. Reducing system pressure by just 10 psig, for example, reduces total compressor power consumption by 5 percent.

Reduce artificial demand and leak losses

Fluctuating pressure due to inadequate system control leads many users to operate their compressors at higher pressures than needed to ensure adequate pressure downstream. Lowering system pressure also reduces the vol-

ume of air lost through leaks and unregulated uses. This extra air consumption, also known as artificial demand, wastes energy. SAM's tight pressure band control reduces both forms of energy waste, and as the chart below indicates, the larger the system, the greater the savings.



Sample Savings Comparison

Installed Compressor Power (hp)	Annual Electrical Energy Costs*	Pressure Reduction (psi)	Potential Annual Energy Savings Based on the Following Operating Hours			
			2000 hr	4000 hr	6000 hr	8000 hr
50	\$35,349	10	\$ 1,200	\$ 2,400	\$ 3,600	\$ 4,800
		20	\$ 2,400	\$ 4,800	\$ 7,200	\$ 9,600
60	\$42,145	10	\$ 1,400	\$ 2,800	\$ 4,300	\$ 5,700
		20	\$ 2,800	\$ 5,700	\$ 8,600	\$11,500
75	\$52,681	10	\$ 1,800	\$ 3,600	\$ 5,400	\$ 7,200
		20	\$ 3,600	\$ 7,200	\$10,800	\$14,400
100	\$70,241	10	\$ 2,400	\$ 4,800	\$ 7,200	\$ 9,600
		20	\$ 4,800	\$ 9,600	\$14,400	\$19,200
125	\$87,239	10	\$ 2,900	\$ 5,900	\$ 8,900	\$11,900
		20	\$ 5,900	\$11,900	\$17,900	\$23,900
150	\$104,687	10	\$ 3,500	\$ 7,100	\$10,700	\$14,300
		20	\$ 7,100	\$14,300	\$21,500	\$28,600
200	\$138,253	10	\$ 4,700	\$ 9,400	\$14,200	\$18,900
		20	\$ 9,400	\$18,900	\$28,400	\$37,800

* Based on 8760 hours of operation per year; \$0.10/kWh energy cost.

Increased reliability

Sigma Air Manager helps ensure a stable system pressure by bringing additional compressors on and off-line to meet demand. It prevents simultaneous loading, which reduces current spikes. If a compressor is not available, SAM automatically loads the next available compressor. It also alternates base load and peak load compressors so that compressors accumulate equal service hours. All of these tools and features add up to increased system reliability and improved system performance.

User friendly

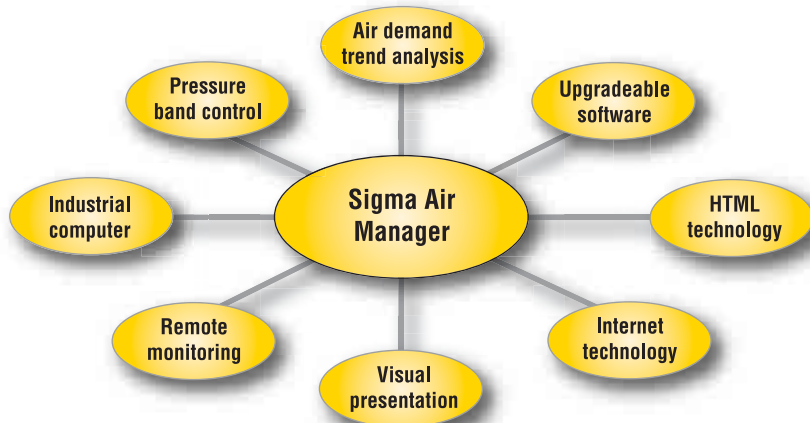
Sigma Air Manager features a simple menu structure with helpful icons and clear graphics. Sigma Air Manager is also pre-programmed with up to 30 standard languages.



Further, SAM installation is easy. SAM is fitted with a Profibus DP interface connecting the compressors with a single Profibus cable and can be wall-mounted to maximize floor space.

Remote Access

With SAM's integrated Internet capabilities, air system data is available from any location. The remote monitoring capabilities of SAM can be enabled to allow our experts to view compressor status and diagnostic codes prior to making a trouble call to assist you and minimize trouble-shooting and repair time.



Sigma Air Control *basic* (standard)

Sigma Air Manager features Sigma Air Control *basic*, a software program that displays a compressed air system's real-time operational status through a standard Internet browser. These HTML pages show the compressor's operational state, SAM's operating panel and the system pressure trends during the last operation phase, as well as service and alarm messages.



Sigma Air Control *plus* (optional)

The optional Sigma Air Control *plus* stores the operational data and makes it available for reporting, system audits, control optimization and long term trending. Password-protected access via a standard Internet browser shows graphic profiles of system pressure, system air delivery, compressor load/unload, duty cycle and power consumption of the compressors for up to one year.



SAM Specifications

Model	Pressure band control	Total controllable compressors ¹	Possible air system interconnection				Spare output signals		Spare input signals		Sigma Air Control with built-in Internet server		Communication interface			Dimensions W x H x D (in.)	Weight (lbs.)
			with Profibus DP		with dry contacts		Digital	Analog 0-20 mA	Digital 24V DC ³	Analog 0-20 mA / PT 100	basic	plus	RS 232 ⁴	Ethernet (for company network) ⁵	Profibus DP (master) ⁶		
			Comps with Sigma Control	Profibus converter ²	Comps without Sigma Control (incl. other mfr.)	Max. no. external transducers for treatment components											
4/4	S	4	4	4	4 (DO)	3 (DI)	1 (DO) spdt	1 (AO)	1 (DI)	-	S	0	S	S	S	15 x 20 x 9	33
8/4	S	8	8	4	4 (DO)	3 (DI)	1 (DO) spdt	1 (AO)	1 (DI)	-	S	0	S	S	S	15 x 20 x 9	33
8/8	S	8	8	4	8 (DO + DI)	7 (DI)	8 (DO) spdt	1 (AO)	1 (DI)	1 / 2 (AI)	S	0	S	S	S	20 x 28 x 10	88
16/8	S	16	16	4	8 (DO + DI)	31 (DI)	16 (DO) spdt	2 (AO)	1 (DI)	3 / 4 (AI)	S	0	S	S	S	32 x 47 x 12	441

S = Standard
 O = Optional, can be retrofitted
 - = Not Applicable

DO = Digital Output
 DI = Digital Input
 spdt = Single Pole, Double Throw dry contacts

AO = Analog Output
 AI = Analog Input

- 1) For example: Sigma Air Manager 8/4; total of 8 compressors, 6 with Sigma Control and 2 without Sigma Control (using dry contacts)
- 2) Possible Profibus converters are 8 DI, 32 DI, or 4 AI/4 AO
- 3) For example: Remote ON/OFF or Alarm Reset
- 4) RS 232 available for:
 - direct use of Sigma Air Control visualization on PC; maximum cable length 50 feet
 - connection to telephone network (optional modem kit for installation in Sigma Air Manager Control cabinet for world-wide use)
 - connection of modbus interface converter; maximum cable length 3,000 feet
- 5) For visual presentation via Intranet/Internet and communication with control center systems
- 6) Connection of compressors with Sigma Control or Profibus converters

Specifications are subject to change without notice.



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The Air Systems Specialist

With over 85 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.

