KAESER COMPRESSORS®

Compressed Air Management System

SIGMA AIR MANAGER® 4.0
Key technology for Industrie 4.0
For compressor and blower stations

www.kaeser.com

SIGMA AIR MANAGER 4.0

Compressed air control technology 4.0 from KAESER

Industrie 4.0 – that's the key phrase to describe the 4th industrial revolution. In addition to the focus on "individualised production processes" and "product-related information exchange", a further factor is becoming increasingly important: time – because time is money.

Based on advanced digital information technology**, Industrie 4.0** interconnects man and machine, equipment and components. This technological revolution is also about real-time information exchange – about data that can be transferred and analysed in real-time. It is this capability that provides the decisive competitive advantage! This technology also opens up new value added-potential by ensuring permanent utility and availability, for example, of important industrial equipment.

Identify, analyse, react: in real-time

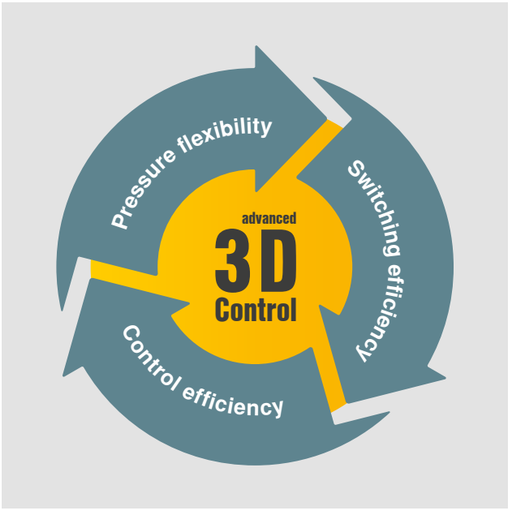
The SIGMA AIR MANAGER 4.0 is the heart of the SIGMA NETWORK and is key technology in the advanced world of Industrie 4.0. As the central mastermind, it controls the entire compressed air supply system and – via the 'Internet of Things' – is responsible for data streaming to a future centralised application called KAESER SIGMA SMART AIR. Process data from the compressed air system is transmitted in real-time. Continuous analysis is subsequently performed with help from specialised algorithms in order to make use of the gathered data, e.g. for Predictive Maintenance purposes.

Centralised compressed air system monitoring (for Predictive Maintenance) is carried out in the KAESER DATA CENTER, together with permanent energy management, to ensure maximum effectiveness of the compressed air supply system throughout its entire life-cycle.

KAESER SIGMA SMART AIR: Predictive Maintenance

The SIGMA AIR MANAGER 4.0 provides the basis for this future service, and, together with future use of the SIGMA SMART AIR service, the following will be possible: The combination of remote diagnostics and needs-based, preventative maintenance helps assure maximum compressed air supply dependability. Through availability of compressed air system process data and the resulting analysis, it is possible to identify the perfect point in the future when your compressed air supply system should be maintained and serviced. This prevents costly periods of downtime, increases energy efficiency (thanks to monitoring of key parameters) and allows compressed air system performance to be precisely matched according to demand throughout the entire life-cycle of the system.

This combination of remote diagnostics and demand-oriented preventative maintenance ensures maximum availability and potentially reduces service costs by up to 30%.



Innovative: The Adaptive 3-D^{advanced} Control

The algorithms in the Adaptive 3-D^{advanced} Control orchestrate interplay between all components and equipment in your KAESER compressed air systems. As a result, just the right amount of compressed air power is provided to suit the specific needs of the application, which in turn assures maximum energy efficiency at all times.

The unique Adaptive 3-D^{advanced} Control continuously analyses the relationship between various parameters (e.g. switching and control efficiency), and proactively calculates the optimum combination from a range of many in order to achieve optimum efficiency. Not only are starts and stops taken into consideration, but so too are idling and frequency converter losses, along with pressure flexibility. Moreover, the compressed air system's pressure performance value is optimised and average pressure is reduced.

SIGMA AIR MANAGER 4.0

What’s on the inside. What’s in it for you.

KAESER SIGMA NETWORK

All components securely networked.

All of the compressor station’s components can be seamlessly integrated into the KAESER SIGMA NETWORK.

Further details from page 6

Upgrade your compressed air station

Future-dynamic: SIGMA AIR MANAGER 4.0 grows with you.

A simple software upgrade is all that’s required to expand your compressed air supply system to meet future demand. There’s no need to change your master controller hardware.

Further details on page 8

Live P&I diagram

Everything at a glance.

Your entire compressed air station represented as a P&I diagram on a 12-inch display.

Further details on page 9

Industrie 4.0

Communication & data exchange in real-time.

KAESER takes full advantage of the very latest digital information technology and networks all components with the core of the system, the SIGMA AIR MANAGER 4.0 controller. The advantages: real-time data exchange for continuous energy and cost optimisation, combined with seamless production flow.

Energy management as per DIN EN ISO 50001

Your energy report quickly and simply.

The SIGMA AIR MANAGER 4.0 is your perfect partner for operational data storage and provides data in accordance with DIN EN ISO 50001.

Further details on page 10

Adaptive 3-D^{advanced} Control

Optimum efficiency.

Monitors and controls compressed air system operation and proactively calculates the most efficient performance solution from numerous potential options.

KAESER SIGMA SMART AIR

All-round carefree service package.

Unique combination of remote diagnostics and service ensures supply dependability and significant cost savings.

Further details from page 16

RFID card

Secure login.

The integrated RFID interface ensures secure login for authorised personnel – without the need for passwords.

KAESER CONNECT

Operation, consumption and cost overview. Anytime, anywhere

All operational and energy consumption data, as well as cost information, can be called up on any network-compatible device anytime, anywhere.

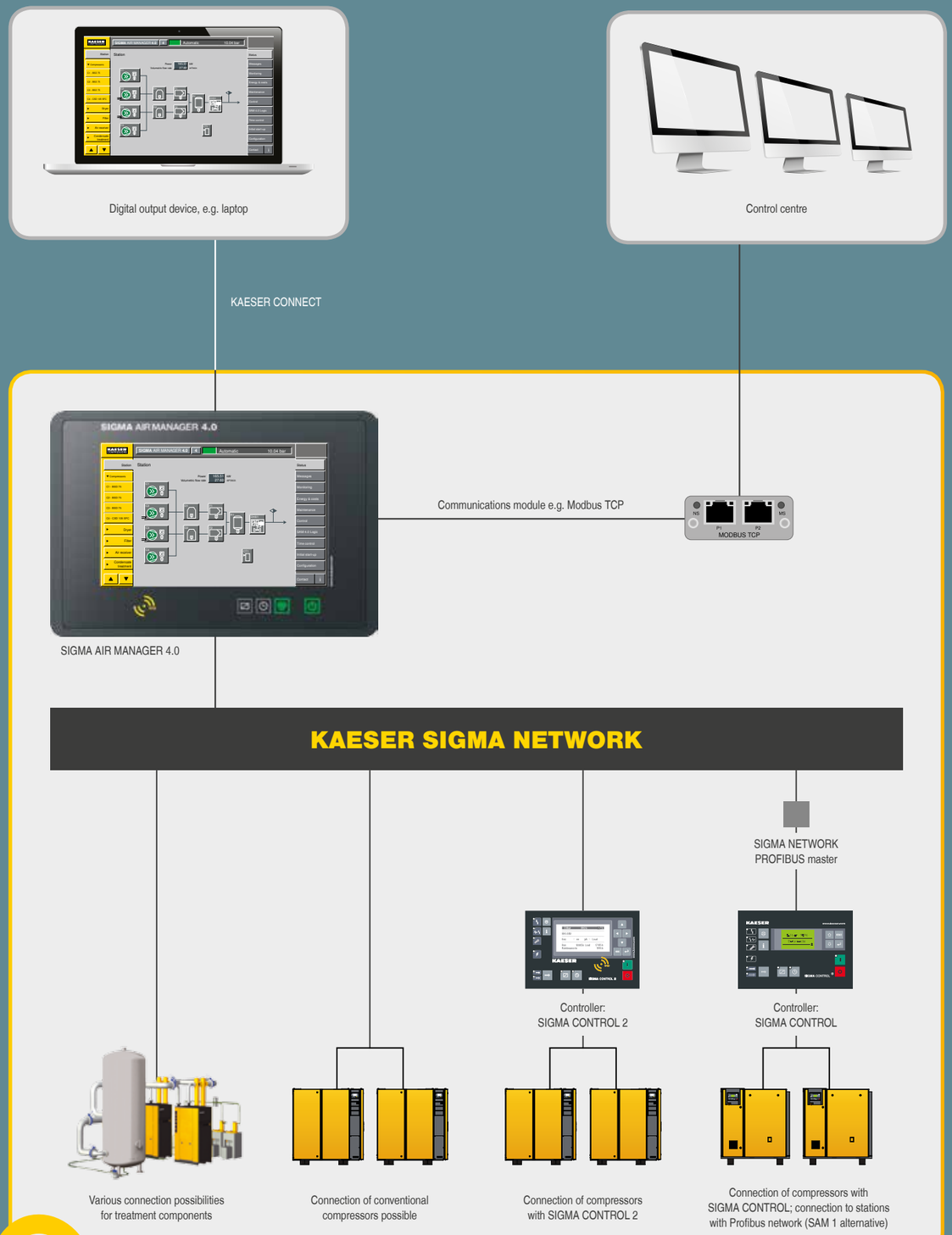
Further details from page 14

SIGMA AIR MANAGER 4.0 Logic

Integrated programmable control.

Individually programmable, system-specific functions, such as the temperature-dependant control of inlet, circulation and exhaust air louvres, can be implemented using this planning tool - without the need for additional PLC.

Further details on page 11



Secure data – secure business!

KAESER SIGMA NETWORK

With high speed and rigorous security standards

Industrie 4.0 places high demands on a data network – it needs to be fast, secure and future-dynamic. The powerful Ethernet-based SIGMA NETWORK developed by KAESER provides optimal monitoring and efficient control of the compressed air station and enables operation within the context of Industrie 4.0.

Furthermore, industrial applications have special demands when it comes to communication technology – including machine to machine communication, which is the basis of Industrie 4.0. Not only must the technology be durable and easily manageable on-site, but should also be globally compatible, fast and secure and be able to transfer large volumes of data with maximum integrity. The KAESER SIGMA NETWORK meets all of these requirements and more.

Secure data

Based on secure Ethernet technology, the future-dynamic network is a local network within the compressed air station that enables optimised integration of a station's components. Unlike current field-bus solutions such as Profibus, CAN or similar technologies that operate at relatively slow speeds (max. 12 Mbit/s), this network boasts a data transfer speed of 100 Mbit/s. The widely accepted TCP/IP protocol standard forms the basis for data traffic in the SIGMA NETWORK. The SIGMA NETWORK uses KAESER-own MAC addresses and creates a closed and secure network segment in accordance with the recommendations for industrial control systems. A defined transfer node enables secure data exchange with external partners.

Basis for Predictive Maintenance

Together, the SIGMA AIR MANAGER 4.0 and the SIGMA NETWORK create a perfectly matched infrastructure and provide the basis for future services such as Predictive Maintenance or energy management, for example. This not only reduces costs, but also increases operational reliability and availability.

If requested by the operator, the operating data from the compressed air station can be securely transmitted to the KAESER DATA CENTER via a broadband connection. This is the prerequisite for KAESER SIGMA SMART AIR.

Compatible

Needless to say, existing KAESER Profibus networks can be integrated into the SIGMA NETWORK.

SIGMA AIR MANAGER 4.0

The future-dynamic solution that grows with your compressed air demand

If your business is growing and so too is your compressed air demand, then it's time to consider expansion of your compressed air supply system.

This poses no problem for the SIGMA AIR MANAGER 4.0, which is ready-designed to accommodate your growing compressed air demand. A straightforward software upgrade is all that's required to expand the master controller's functionality – there's no need for additional investment in new hardware.

Therefore, with a software upgrade, a SIGMA AIR MANAGER 4.0 initially capable of controlling only up to four compressors can be updated to control up to eight, or even sixteen, compressors. Therefore, the capacity of your SIGMA AIR MANAGER 4.0 can be easily adapted to suit your current compressed air needs.

For you, this ensures planning security and is an essential prerequisite for you to be able to lead your company safely into the future.

Pipework and instrumentation flow diagram (P&I diagram)

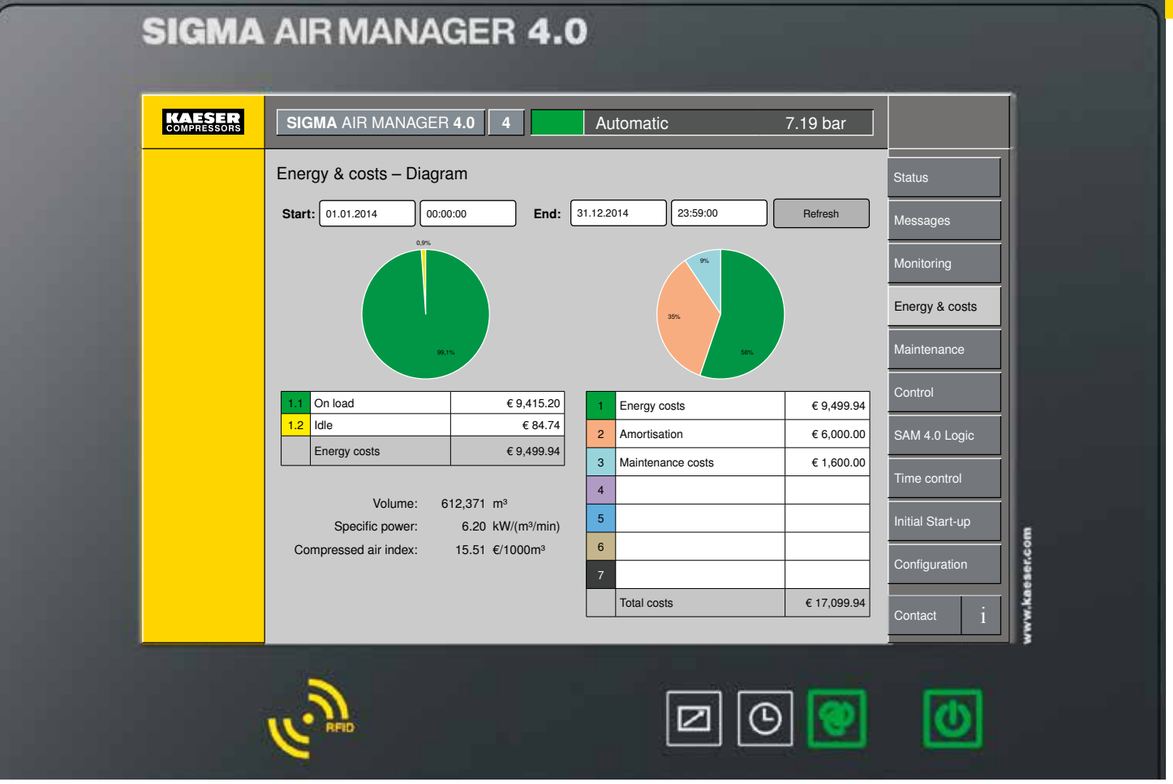
View your entire system in a P&I diagram – live

The SIGMA AIR MANAGER 4.0's **P&I diagram** shows all components comprising your compressed air station. Data can also be displayed for subsequently installed equipment and is available in the SIGMA AIR MANAGER 4.0. All of the connected components are visible at a glance and can be quickly identified via clear, individual designation.

Operational statuses are colour-coded for visualisation. Everything you see is live!

The live **P&I diagram** displays the following parameters:

- Operational status of individual components
- Alarm and maintenance messages for individual components
- Flow rate
- Power
- Pressure
- Additional measurement signals, such as pressure dewpoint and ambient temperature, for example, can also be processed



Energy management certification as per DIN EN ISO 50001

On-demand energy reports – in the blink of an eye

As a leading compressed air systems provider, it goes without saying that KAESER provides unrivalled service and expertise when it comes to energy efficiency. The SIGMA AIR MANAGER 4.0 is a comprehensive solution that allows you to store and analyse all relevant, energy-related data from your compressed air supply, and then create specific reports for your certification – all in the blink of an eye.

How the SIGMA AIR MANAGER 4.0 works for you:

To reduce both the environmental impacts and costs for your business, the DIN EN ISO 50001 standard sets out how businesses should systematically and continuously improve their energy efficiency and rewards them accordingly through tax incentives and renewable energy surcharge rebates.
The SIGMA AIR MANAGER 4.0 helps you create the associated certification reports effectively and quickly: it provides secure storage of your compressed air station's operating data and offers detailed analysis and energy balances.

The following information is provided:

- Performance figures for the compressed air system or individual components for energy management certification in accordance with DIN EN ISO 50001
- Compressor load data, air delivery, performance, specific power requirement
- Total costs
- Graphical display of cost overview (with the possibility for manual value input, e.g. for maintenance and repair costs)
- Operating data from the long-term memory for measuring signals (over an elapsed period of up to one year)
- Energy cost settings
- Compressed air performance figures up to 6 years

The data can also be exported. The cost centre report can be called up at any time via KAESER CONNECT with a network-compatible end device. Furthermore, a periodical report can be forwarded to a user-definable e-mail address.

SIGMA AIR MANAGER 4.0 Logic

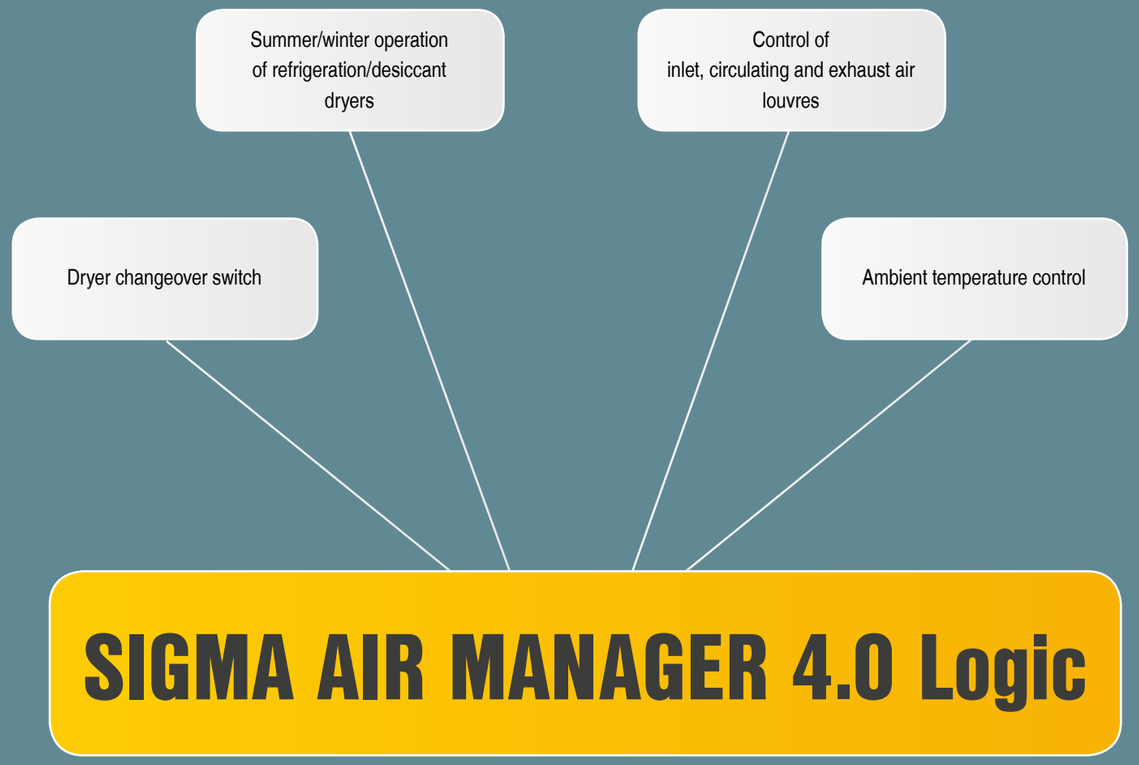
Integrated programmable control for individual programmable functions

SIGMA AIR MANAGER 4.0. Logic allows customised functions to be individually programmed via the KAESER "Engineering Base" planning tool.

Therefore, using logic functions, it is possible to make inlet, circulating and exhaust air louvres operate according to temperature, for example. This powerful feature essentially makes any additional PLC or logic control redundant.

This integration not only makes operation simpler, but also provides a significant cost advantage compared to the usual combination of a conventional controller with an additional programmable logic controller (PLC).

If you would you like to find out more about **SIGMA AIR MANAGER 4.0. Logic** simply contact your KAESER representative regarding this optional service.



Easy-read 12-inch colour display

Durable, easy-to-use touchscreen

touch

Advanced, capacitive touch technology, offset supplementary keys and durable LED illumination make the SIGMA AIR MANAGER 4.0 an exceptionally user-friendly tool, and not just on the haptic level since it also supports 30 languages.

1) Status

- Overview: pressure curve information, pressure display, current values, history
- Manual pre-selection: compressor/blower selection
- Sources: display of pressure & power, pre-selection, priorities
- Station: display of your system in the P&I diagram, measurement values, current statuses, running hours and serial data

2) Messages

- Display of “unacknowledged” messages
- Display of “current” messages
- Display of history (all messages)

3) Monitoring

- Compressed air consumption
- Specific power
- Measurement data

4) Energy & costs

- Energy cost table
- Energy cost diagram
- Energy and costs in self-defined time-frame comparisons
- Tariff configuration
- Report: Sending of a report to a freely definable e-mail address at a freely definable interval, e.g. key energy management figures in accordance with DIN EN ISO 50001

5) Maintenance

Graphical representation of compressed air station (compressors, blowers, dryers, filters etc.). The maintenance statuses of the individual components are visible at a glance.

6) Control

- Nominal and actual pressure values
- Pressure monitoring

7) SIGMA AIR MANAGER 4.0 Logic

SIGMA AIR MANAGER 4.0 Logic enables users to take advantage of customised functions tailored to their specific compressor station. Using logic functions, it is possible to make inlet, circulating and exhaust air louvres operate according to temperature, for example.

8) Time control

- The compressed air station can be controlled via the integrated timer. 99 switching points are available.

9) Commissioning

- Overview of all SIGMA NETWORK inputs and outputs
- Overview of all compressors connected via PROFIBUS and all PBUs (Profibus I/Os)
- Overview of all connected compressors with SIGMA CONTROL 2 via SIGMA NETWORK
- Update to most current software version
- Importing an expanded / customised compressed air station configuration
- Saving of setting data, event history and log files on SD card
- Information and settings for connection to control centre

10) Configuration

- SIGMA AIR MANAGER 4.0 serial data
- Interface settings
- E-mail settings
- Date, time, language
- User management
- Display settings, key lock

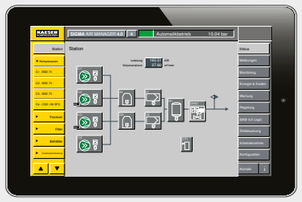
11) Contact

KAESER contact information.

12) i-Button

Online operating instructions can be called up via the i-button.

Smart phone visualisation



Tablet visualisation

Laptop visualisation

PC visualisation

KAESER CONNECT

Always in view – with any network-capable end device

The SIGMA AIR MANAGER 4.0's integrated web server provides visual display of all compressed air system data in the form of HTML pages.

The information is available anytime, anywhere, and can be visualised in real-time on all network-capable devices.

Your all-round carefree service package

Each individual component from the **KAESER SIGMA NETWORK** is a premium quality product based on KAESER's decades of engineering and manufacturing expertise.

The benefits derived from this knowledge can be decisive for you and your business, since only KAESER ensures seamless compressed air supply and provides optimum energy-efficiency for your compressed air system.

Furthermore, the unique combination of remote diagnostics – performed by KAESER compressed air experts – and needs-based, preventative maintenance offers you an unparalleled degree of compressed air supply security and significant cost savings.

With the **KAESER SIGMA SMART AIR** service package, KAESER lets you benefit from its complete full-service spectrum from hardware to software, installation to commissioning, or data analysis to dynamic maintenance. KAESER delivers and oversees your business's entire compressed air supply, day in, day out, 24/7.

If you would you like to learn more about **KAESER SIGMA SMART AIR** simply contact your KAESER representative.

Advantages at a glance

- → Maximum availability
- → Optimum efficiency
- → Low life-cycle costs
- → Ideal service management
- → Energy management certification as per DIN EN ISO 50001
- → Future-dynamic

Compressed air station with SIGMA AIR MANAGER 4.0

Cloud

Mobile user

KAESER DATA CENTER

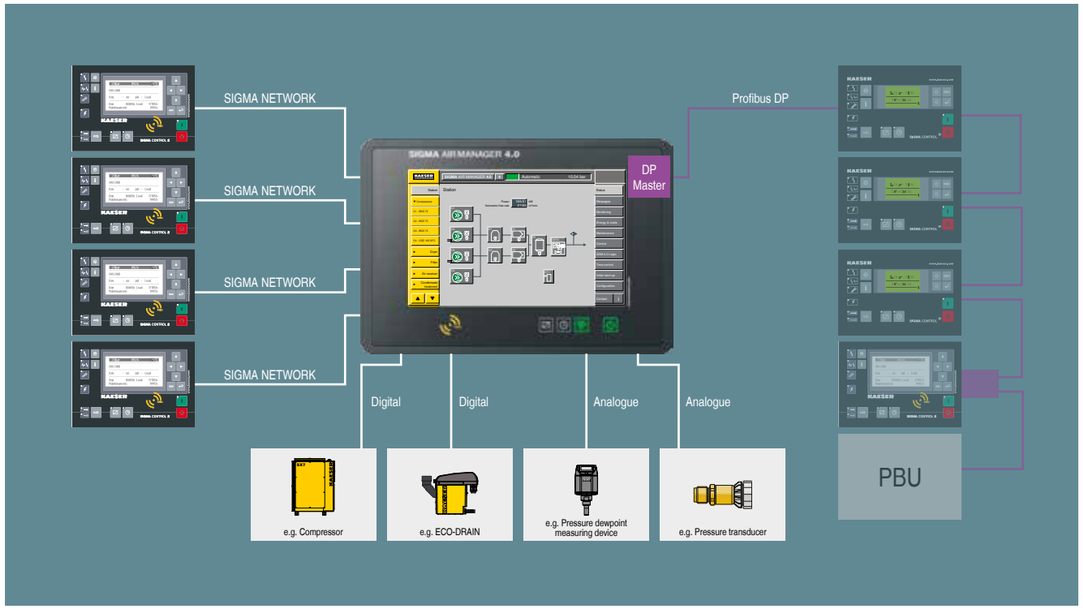
Round-the-clock service and energy management

KAESER AIR SERVICE, KAESER ENGINEERING

Technical specifications

	SIGMA AIR MANAGER 4.0 - 4	SIGMA AIR MANAGER 4.0 - 8	SIGMA AIR MANAGER 4.0 - 16
Control and regulation			
Adaptive 3-D^{advanced} Control	Standard		
Flow rate control	Optional		
Possible air system interconnections			
Max. no. of controllable compressors	4	8	16
Compressors with SIGMA CONTROL 2 via SIGMA NETWORK	4	7	7
SNW ports RJ 45	Standard (7 ports)		
SNW ports RJ 45 / FOC (optical fibre)	Optional		
Available input signals			
Digital 24V DC (e.g. ECO-DRAIN, compressors without SIGMA CONTROL, remote ON-OFF)	6		
Analogue 4-20 mA (e.g. pressure dewpoint measuring device, pressure transducer)	4		
Available output signals			
Relay outputs (e.g. third party compressors, compressors with SIGMA CONTROL Basic, group alarm)	5		
Equipment			
Visualisation via integrated web server	Standard		
Operating data long-term memory 1 year	Standard		
Pressure transducer	Standard		
Communications interfaces			
Gigabit Ethernet for remote visualisation (web server)	Standard		
Slot for communications module (e.g. PROFIBUS DP, PROFINET IO, Modbus TCP)	Standard		
SD HC/XC card slot (e.g. updates)	Standard		
Dimensions, mass			
Width x Depth x Height in mm	540 x 284 x 483		
Mass in kg	20		

Equipment



Compressed air station with SIGMA AIR MANAGER 4.0 – Possible connections

Control systems

Specially adapted industrial PC with powerful “Quad Core” processor, featuring an operating panel, control and processing unit, communications interfaces and integrated web server. SIGMA NETWORK ports, digital and analogue input and output signals.

Man / machine interface

Intuitive operation; LED-backlit 12.1-inch TFT, 16:10 ratio industrial colour display with capacitive touch technology, 1280 x 800 pixel resolution, four LED backlit touch keys, RFID read / write device for KAESER Equipment Cards and KAESER RFID keys, 30 selectable languages.

Communications interfaces

Gigabit Ethernet for remote visualisation (web server), e-mail, slot for communications module (for connection to control centre), SD HC/XC card slot (e.g. for updates).

Control cabinet

Stainless steel / polymer control cabinet for wall-mounting, dust and splash proof to IP 54 CE, cULus, international radio licences.

Options

SNW ports RJ 45 (+6 ports), SNW ports RJ 45/FOC (optical fibre), SNW PROFIBUS Master e.g. to connect compressors with SIGMA CONTROL communications modules: PROFIBUS DP, PROFINET IO, Modbus TCP.

Upgrade

Software upgrade to increase the number of controllable components. Hardware change not required.

Accessories

SIGMA NETWORK bus converter (SBC) is available to expand the control unit. The SBC can be equipped with digital and analogue input and output modules, as well as with SIGMA NETWORK ports.

The world is our home

As one of the world's largest compressed air systems providers and compressor manufacturers, KAESER KOMPRESSOREN is represented throughout the world by a comprehensive network of branches, subsidiary companies and authorised partners.

With innovative products and services, KAESER KOMPRESSOREN's experienced consultants and engineers help customers to enhance their competitive edge by working in close partnership to develop progressive system concepts that continuously push the boundaries of performance and compressed air efficiency. Moreover, the decades of knowledge and expertise from this industry-leading system provider are made available to each and every customer via the KAESER group's global computer network.

These advantages, coupled with KAESER's worldwide service organisation, ensure that every product operates at the peak of its performance at all times and provides maximum availability.

LGA InterCert
Certified QM/EM System
ISO 9001:2008 / ISO 14001:2004

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