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Magazine for the use of compressed air in industry

Generation: Power on - pipe on - done - compressed air station in the container

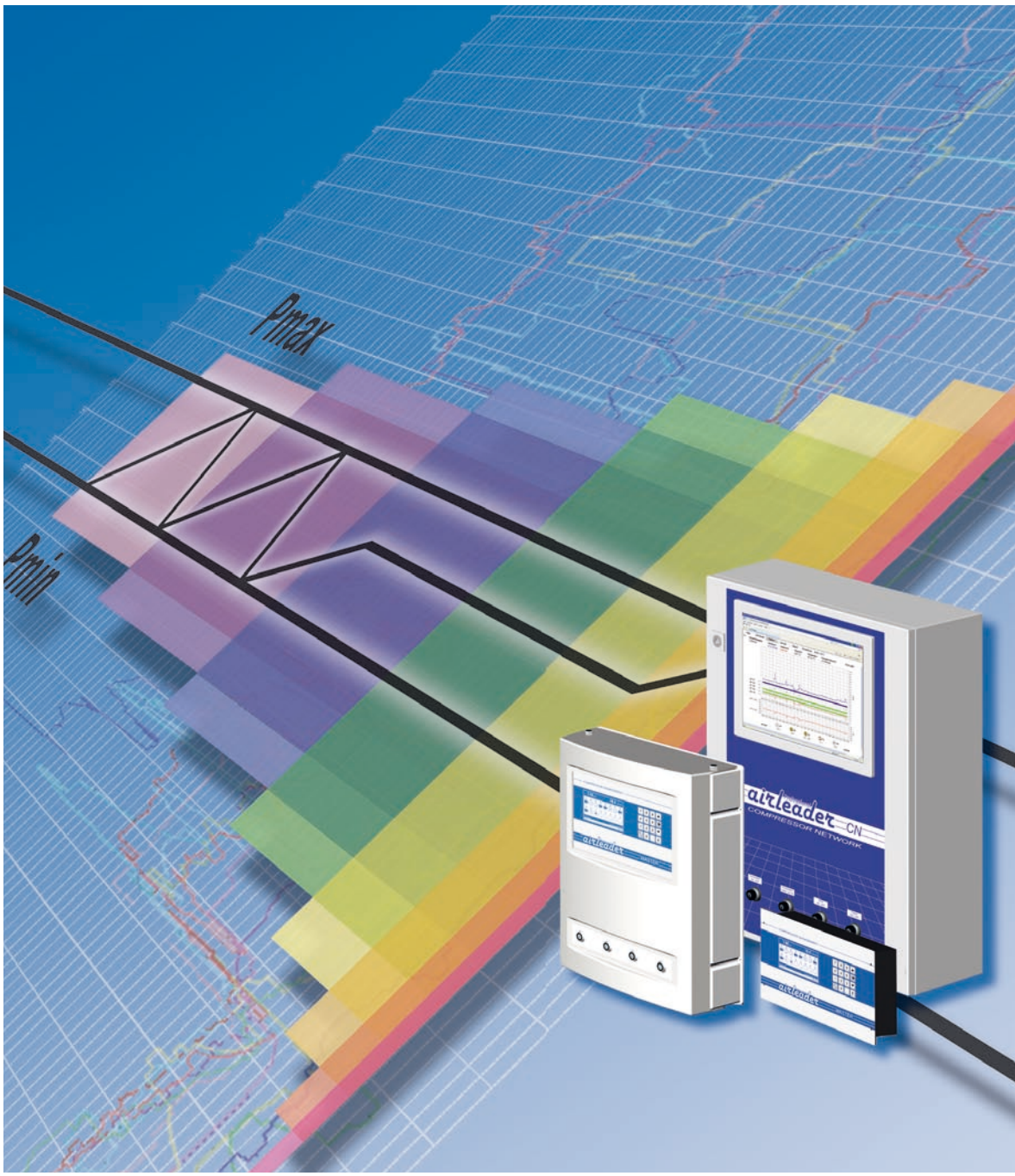
Preparation: Efficient, consistent, goal-oriented – compressed air preparation as a holistic task

Condensate technology: The safe way to treat condensate

Distribution: Waste of compressed air - the cause is not the compressors or evaporation, but always the distribution

Product mirror:

Condensate drainage and treatment



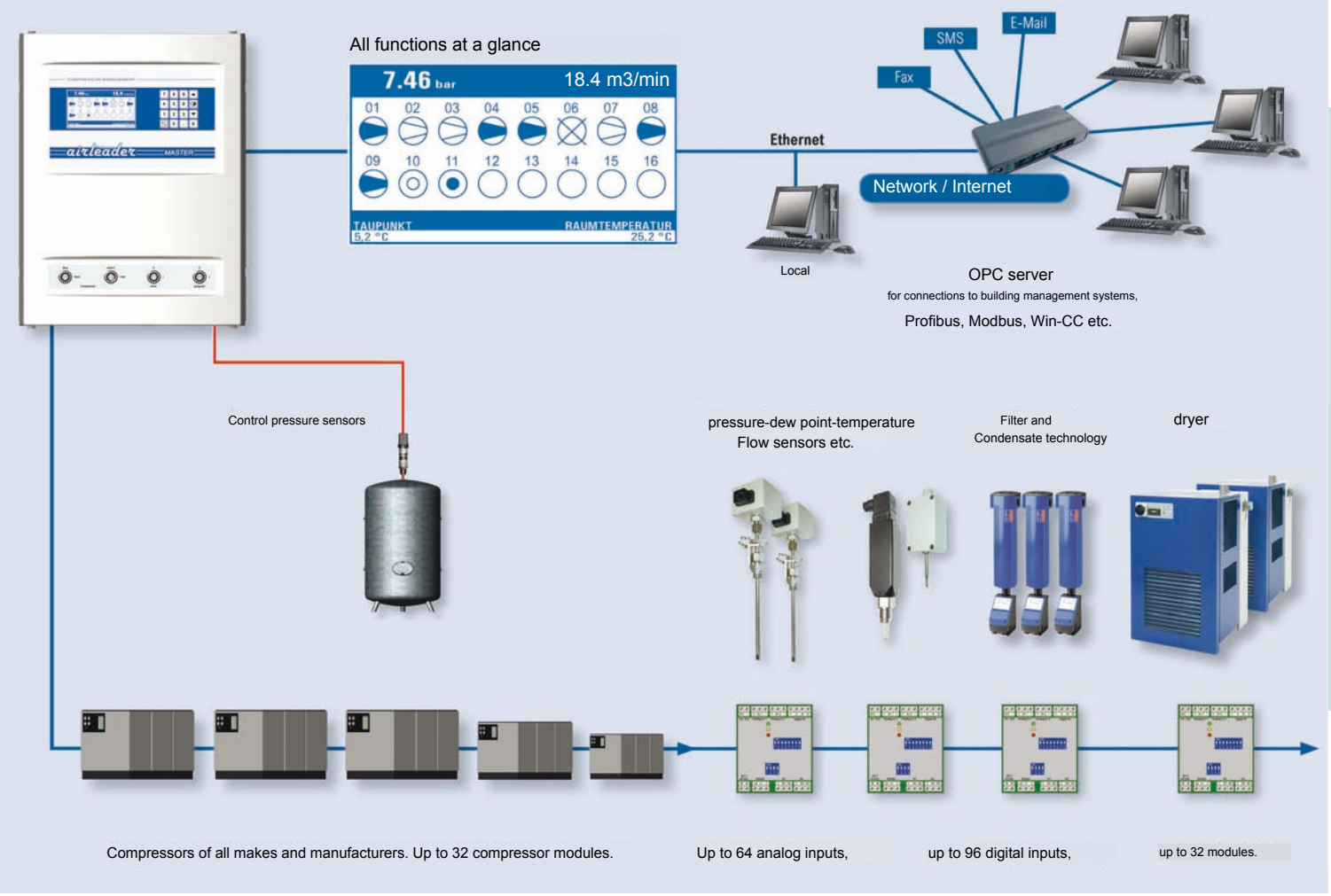
TITLE

Perfectly managed!

Effective solution for energy-conscious people

Compressed air users

•UNITED SPECIALIST PUBLISHERS



Werkbilder: WF Steuerungstechnik GmbH, 75446 Wiernsheim

Perfectly managed!

The airleader as an effective solution for energy-conscious compressed air users

Werner Weidner

In Europe, 10% of industrial electricity demand is used to produce compressed air - and demand is increasing. An EU study commissioned by the Fraunhofer Institute [1] found that compressed air-specific energy costs are up to 30% higher than necessary. Compressed air is expensive, so over more than 28 years of planning and selling compressor stations, the wishes of compressed air users for efficient compressed air production have been compiled and implemented in airleader compressor management. The airleader manages every compressed air station perfectly.

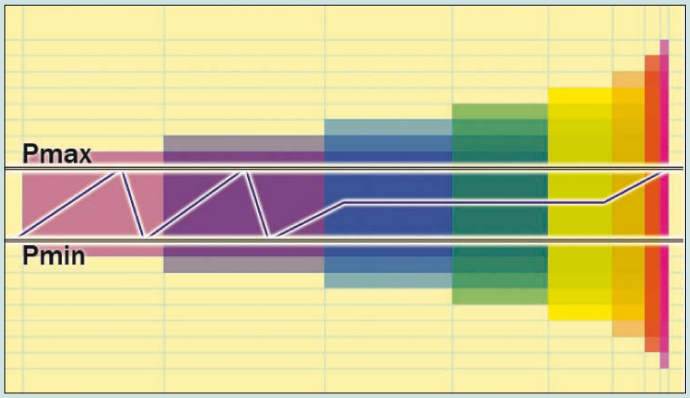
For over 18 years, the airleader has been the effective answer for energy-conscious compressed air users who use the lever in the right place to avoid unnecessary costs in the first place. It reduces all running costs demonstrably and sometimes dramatically: it offers

- fewer compressor operating hours,
- fewer load and idle hours,
- less spare parts costs and
- less service costs.

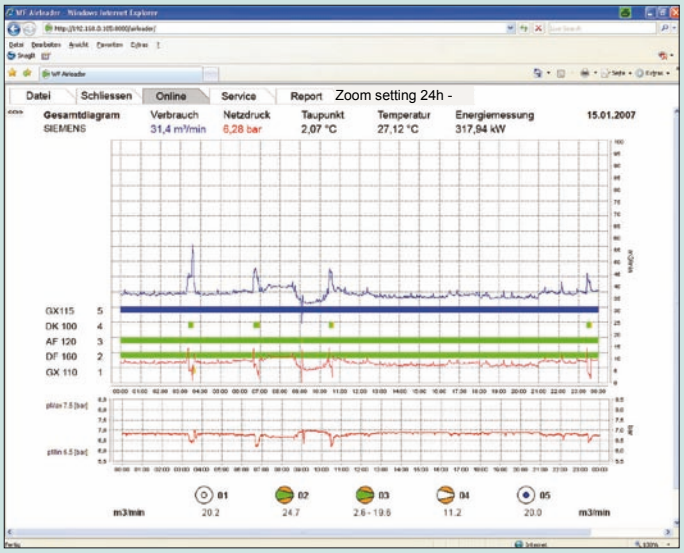
Only as much compressed air as necessary

The airleader automatically optimizes the compressed air production of several compressors and adapts itself to changes. Through iterative calculation processes, the airleader permanently and automatically determines the network dynamics, the network volume, the current compressed air consumption and other parameters. There is no need for time-consuming adjustment, running in, adjustments or anything similar! The system is easy to use. All you have to do is enter the compressor volume flows and the desired pressure band: done - the airleader takes care of everything else. It combines different compressors into a unit that automatically adjusts itself based on the current compressed air consumption of the respective production. It is ensured that only the most efficient compressor combination always produces the compressed air required for production, regardless of manufacturer and performance. The compressor combination works with sensible hysteresis calculation, with the lowest possible load-idle switching cycles and therefore the lowest idle times. Instead of running large compressors at idle, the right combination runs under load with the smallest compressor cycling.

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The eight-fold, self-learning calculation depth ensures the dynamic adjustment and selection of the compressors to the compressed air consumption



The integrated monitoring provides a transparent image of the compressed air station

As low as possible system pressure

The system pressure remains within the lowest limits and care is taken to ensure that the costs incurred remain as low as possible. By connecting several pressure sensors, more distant operating parts can be monitored and integrated into the control pressure. If a running compressor within the pressure band malfunctions or is switched off for maintenance, its output is replaced by other compressors.

The eight-fold, self-learning calculation depth ensures the dynamic adjustment and selection of the compressors to the compressed air consumption. Compressed air consumption and dynamics are continuously calculated and evaluated in time windows of varying lengths. If necessary, the correct compressor combination is always switched. Unnecessary switching cycles are prevented.

Comfort in operation

Compressors with the same performance receive the same number of operating hours, taking motor running times into account. The compressors are replaced without a pressure drop within the pressure band.

By manually specifying priorities, the compressors can work at different levels (ranks). This function is often used for compressors with heat recovery (preferred priority) or reserve compressors (lower priority). Compressors at the same level work automatically depending on consumption.

Up to four speed-controlled compressors are actively integrated. The speed-controlled signals are sent via the analog output

Compressors apply the information about the compressor speed to the airleader. This is parameterized there according to the minimum and maximum volume flow. Programmable control limits allow additional compressors to be switched on and off continuously, so that the controlled compressor can always operate in the energetically favorable speed range.

Transparent compressed air station

The integrated monitoring records the control process down to the second and provides a transparent image of the compressed air station. The standard web-based visualization enables access to all data via an Ethernet connection. The clearly prepared tables and diagrams can be viewed via Internet Explorer from all access-authorized computers. This makes detailed cost control of compressed air production possible.

Airleader also supplies higher-level central control systems with information in real time. For this there are e.g.. OPC server, XML-RPC, SOAP web services, Modbus interface or the exchange of digital and analog signals directly on the control.

The standard 2 GB data memory is sufficient for a storage capacity of around four years with all compressor and sensor states recorded every second. The data can be read out at any time using a laptop. If the web visualization is connected, they are carried in parallel and synchronized if necessary.

Compressed air quality monitoring and incident handling

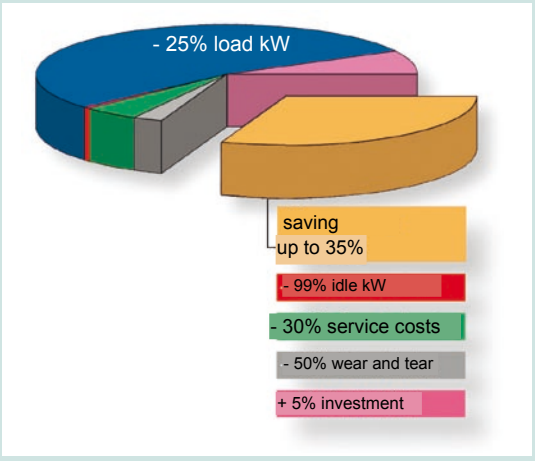
Using connection modules, up to 20 analog sensors for monitoring compressed air quality (pressure, dew point), cooling water (pressure, temperature), room temperatures or compressed air balances (flow sensors) can be connected to the airleader in the smallest expansion level as standard. Each analog input has a switching output that is activated when the limit value is exceeded. Up to 24 additional digital inputs for fault or operational messages are recorded, monitored and visualized at the same time. This allows the correct operation of auxiliary units such as dryers, condensate drains, ventilation, cooling water pumps, etc. to be completely verified.

Operating time in Bh/a	2,000	4,000	6,000	8,760
installed compressor power in kW	100	200	250	500
average utilization in %	75	75	75	75
assumed DL key figure in kWh/m3	0.135	0.135	0.13	0.12
Compressed air requirement per year million m3	1.11	4.44	8.65	27.38
Savings potential in %	25	25	25	25
Electricity price in euros/kWh	0.075	0.075	0.075	0.075
Energy savings in euros/year	**2,813**	**11,250**	**21,094**	**61,594**

Table: Possible savings potential based on some practical examples



airleader master module



Significant savings can be achieved by using an airleader

Only one RS485 connection module is used in each compressor. Wiring is done simply via an RS485 bus cable from compressor to compressor. The RS485 interface is galvanically isolated to avoid interference.

Everything important at a glance

The online visualization runs as a background service on a server and enables access to the airleader from any PC in the network via Internet Explorer and the IP address. It doesn't matter how many participants access the airleader at the same time - the visualization does not slow down. The data is stored in a server directory and is then subject to internal data backup. A defect on the device's memory card does not result in irretrievable data loss. On the other hand, missing data is caused by connection interruptions, e.g.. during server maintenance, automatically synchronized again after the connection has been established using the data stored in the airleader.

Energy and compressed air accounting

A report generation periodically and automatically creates one at a time

- day,
- weekly and
- Monthly balance with all energetically relevant compressed air parameters, clearly compiled for each compressor and added up for the entire compressed air station. In addition to the energy and running time data, the number of motor starts and the number of load-idle switching are also recorded.

drawn, which with the airleader are usually only a small fraction compared to before. This saves additional service and spare parts costs.

With a click of the mouse, an Excel or Word program opens in which a balancing table is already entered. This means that all fields are available in a handy form for further processing within the company. Installed consumption sensors (flow meters) are added up for the respective period in addition to the curve display.

Preventive maintenance becomes easier

The operating hours of each compressor are counted separately according to total and load hours and displayed in the service mask. Up to four service positions with different service intervals can be determined for each compressor (e.g. filter mats 500 h, air filter 1,000 h, oil and oil filter 2,000 h, oil separator 4,000 h). After programming (or Reset after maintenance), the times entered count down to zero. If a time has expired, this maintenance message is entered into the monthly alarm and service report at the exact time. The time counts down and turns red. A service warning also appears on the screen. The interval time can be individually reset to the previously set interval using the reset buttons. If a compressor or additional device malfunctions, this message is included in the monthly alarm and service report and appears on the screen as an alarm warning. Accumulating fault reports are detected early; the

A clear monthly report in a table format helps.

Incident notification

Compressor malfunctions always lead to a collective fault message, which is output directly via a switching contact. The same happens with connected accessory faults with a separate collective fault contact. In this way, two different important alarm paths can be set up and connected to existing alarm distributors (central control system, telephone system or similar). With the “WEB Server PLUS” option, email, fax and/or SMS notifications can also be generated directly from the web visualization, which are also activated in the event of maintenance messages and limit value violations from connected sensors. This enables even more reliable operation of compressed air generation.

Complete documentation

The curve diagrams of all similar sensors can be displayed both overlaid and individually using the standard visualization. Extensive diagram evaluations leave no questions unanswered. Both the proper functioning of the compressed air system and malfunctions are completely documented and archived. This means that appropriate proof can be provided quickly at any time if required.

Increase operational safety and monitor efficiency

With the airleader, operational safety can be increased and efficiency increased.



The airleader Professional 4 is the basic version



The airleader CN currently offers the highest level of expansion

wake up – automatically! The current and power measurement on the compressor enables automatic

- intake controller defect detection,
- drive defect detection,
- Detection of uncontrolled compressors and one
- Dead compressor detection. A defect in the intake regulator can have many causes, such as: B. a broken return spring, a stiff actuating cylinder, a defective relief valve, a clogged relief throttle or a kinked pneumatic line. The result is an intake flap that is not opened or only partially opened under load. With a delivery level of e.g. b. At 40% the compressor still draws 85% power! This is a complete waste of energy. Such a defect is usually difficult to detect because the compressor actually behaves normally. Hardly or not at all visible from the outside, such a compressor can work unnoticed for months with a lower delivery volume but high power consumption. Since a different compressor runs more, you might just wonder about the supposedly increased consumption at the factory.

A drive defect is not quite as insidious: on the outside, the compressor behaves normally, the motor is running and the load hour meter is counting. But the compression stage does not produce compressed air because it is not driven. Sometimes a change in noise level is noticeable. The airleader connection module for the compressors has an input for this as standard. A single-phase amp or three-phase kW measurement can be connected here, which is permanently monitored via the web visualization.

Especially with older compressors that are controlled via pressure switches without electronic control, it often happens that they develop a life of their own. They then either do not start when airleader requests a load or start without being requested by airleader. The reason for this is that the compressors have to run in an intrinsically safe manner, i.e. they still produce air if the higher-level control system fails, even if it is not energetically optimal. As a result, the load contact of the airleader must be connected in series to the internal pressure switch and the pressure switch setting must be selected so that it is always closed during airleader operation. If the pressure switch is always open due to the pressure setting being too low, the compressor will be “dead” when the airleader load contact closes. The automatic monitoring of the current thresholds reliably detects all cases:

- Current threshold 1 (load running alarm value): This ampere value must be included in load running must be reached within an adjustable time (start phase), otherwise an alarm is triggered (intake regulator defective, belt broken, compressor turns “dead”).

- Current threshold 2 (idle alarm value): This ampere value should not be exceeded within an adjustable time after unloading while idling, otherwise an alarm is triggered (compressor runs independently under load).

- Current threshold 3 (standby alarm value): This ampere value corresponds to the “ready for operation” state and should be below this value after an adjustable time has elapsed, otherwise an alarm is triggered (compressor runs independently under load).

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Reference: [1]: Radgen, P.; Blaustein, E.: Compressed Air Systems in the European Union; 2001; ISBN: 3-932298-16-0

Various designs to choose from

The airleader compressor management is available in various versions with different performance levels:

- airleader CN (32 compressors, up to 4 speed-controlled compressors, 32 connectable analog modules for sensors and accessories, a maximum of 136 connectable analog sensors, 17" color touchscreen, industrial housing for wall mounting, 40 GB storage capacity for detailed status history and statistical data, 2 RS485 interfaces, 1 Ethernet connection);

- airleader master module (16 compressors, up to 4 speed-controlled compressors, 8 connectable analog modules for sensors and accessories, a maximum of 52 connectable analog sensors, LCD display, industrial housing for wall mounting, 2 GB storage capacity for detailed status history and statistical data, 2 RS485 interfaces, 1 Ethernet connection);

- airleader Professional 4 (4 compressors, 1 speed-controlled compressor, industrial housing for wall mounting, 1 RS485 interface).