

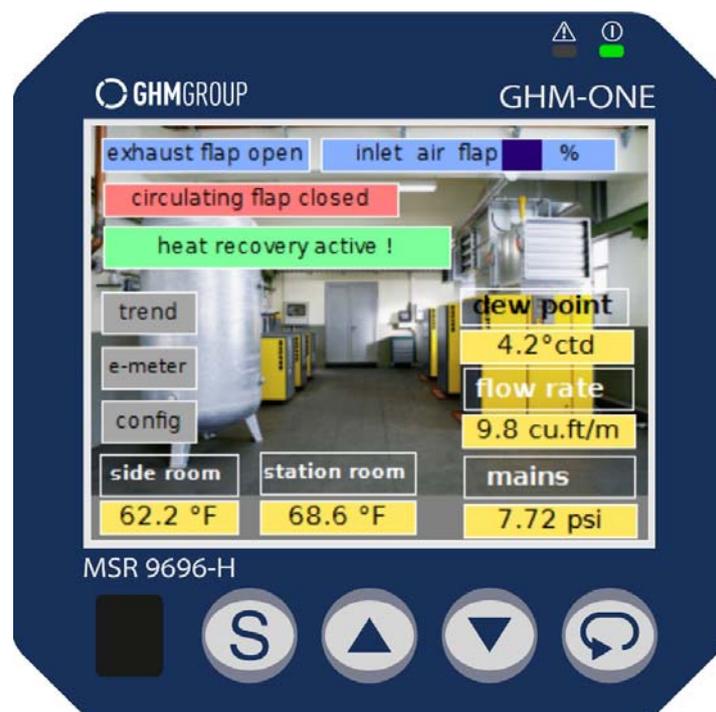
Professional article

GHM-ONE for more efficiency

Production system technologies in production plants are often operated with compressed air. They entail clearly audible ticking, whizzing and rustling background noise as well as high energy costs due to pressure loss. With the market innovation, the GHM-ONE multi-function device, combined with the GHM-CAT (Configuration and Application Tool) engineering tool and the high-precision sensors of the renowned measuring technology manufacturer, the GHM GROUP, these losses can be eliminated and additional energy costs in accordance with DIN EN ISO 50001 can be reduced so that the energy efficiency of the systems can be increased significantly.

The requirements

The compressed air supply of industrial production plants must provide an adequate amount of air for all machine processes at a constant system pressure while reliably avoiding drops below the dew point. The measuring technology that is used enables detection of leaks and provides information about system optimization and permanent reduction of energy costs. With intelligent, time-optimized activation of the individual consumer machines, the total amount of air consumption can be kept within economically logical limits (measured on the basis of the graduated energy prices for maximum withdrawal). The purposeful heat recovery of compressor systems for room ventilation technology fulfils an additional point of the energy saving according to DIN EN ISO 50001. The system process data and individual consumption values must be monitored automatically to assure the compressed air quality and production availability and the processes must be documented and available for review locally in a clear layout and accessible through the company communication network.



Tried and tested approach

Used as a central energy management system, the compact GHM-ONE multi-function unit shows the system operator the status of process data and trend curves (short-term and long-term) for efficiency evaluation in a clear layout on a colour touch display. The sensors are connected directly, such as a dew point measuring transducer (measuring range -20 to +30 °Ctd, optionally -40 bis +30 °Ctd), type GHM series EPS 2 pressure measuring transducer (0..16 bar) for system pressure and type GHM Labo-FG-I/U/F/C volume flow meter in m³/min, which reliably calculates the consumed volume from the flow speed and gas density. The supply and exhaust air, including circulating air of the central compressor station and, if applicable the ancillary room are regulated with corresponding temperature sensors and via motors (for fans, valves). An easily expandable number of energy meters (kW/h) for the individual consumers and connection of logic signals for the start and locking signals account for the entire process data recording in GHM-ONE (MDE, BDE). For this purpose, custom adaptation can take place at any time with the modular device system technology and directly connected industrial network topology (field bus and Ethernet) provided by this multi-function device. It is based on a powerful processor that serves as a base unit in combination with a relay board and the power board. The base unit is adapted to the application with a communication card and up to two I/O cards. The number of physical inputs and outputs is expanded via the communication card. This modular layout enables specific adaptation of the hardware to the automation task.

Quick adaptation

The quick adaptation of software components to the individual customer requirements takes place via the intuitive, graphically operable tool GHM-CAT. It essentially consists of the function plan editor, HMI editor, menu editor, simulation and commissioning support with debug function and online diagrams.

The core of the application creation is the function plan editor with the function module library. The user builds their application using the function modules without any programming skills.

The library consists of more than 100 tested functions that the user simply places on the desktop and wires together using the mouse. The declaration of variables and complex assignment of functions are eliminated. In this manner, the user can effectively replicate their system or process with finished modules.

The operating and monitoring screens of the application are created with an integrated designer. Therefore, specific information can be clearly represented for the person on site and detailed screens can be created for service technicians. These screens can be configured freely. It is even possible to integrate process images or other graphics. Moreover, the user can create text-based operating screens in order to enable swift entry of a variety of process data.

After the application has been created, it is also tested in GHM-CAT. The software offers an exact replication of the device in all its functions with the simulation. Even the inputs and outputs of the hardware can be simulated. In this manner, the user can test the application in an initial step – without any risk for the system. In the scope of commissioning, the user is additionally

supported by the GHM-CAT software with various forcing and debugging functions and a refined online representation of analogue and digital values. With the diverse information and intervention possibilities, there are no obstacles to efficient commissioning.

Data recording and trend representation

The library of the GHM-ONE offers the possibility of implementing a data logger and data writer in the device. The configuration of the data logger takes place directly in the GHM-CAT application with function blocks. In the process, it is possible to log digital and analogue signals in different time patterns.

The analogue data can be recorded as minimum, maximum or average values over specific time patterns. The data is saved on an eMMC chip in the device and can be read via the Ethernet port via FTP and via the front-side USB port. The device offers 2 GB of data memory.

The loaded data is available to the user in a standard ASCII format (csv) for further editing and analysis. The trend representation on the device takes place on predefined operating screens. Up to 4 time-variation curves can be represented in a trend.

Various time patterns can be represented with the cascading of the function. Because the trend block can be viewed multiple times in the visualization, it is possible to use the GHM-ONE as a multi-channel writer. The trend representation is independent of the logger function. Therefore, different process signals can be displayed and recorded. The library also offers alarm management functions. A function block can be used for display of alarm lists in plain text on the device. The alarm management contains an acknowledgement function.

Concrete results

With this equipment, the user determines the individual consumption processes of their individual production machines and the leakage portion in the overall system. Based on the resulting process data analysis, the necessary number of screw compressors to be activated, the reduction/ decrease of the buffer tanks used on the machines, and the measures for elimination of leakage are optimized. Therefore, with an intelligently processed, individual machine start, the overall amount of compressed air to be provided by the system is reliably adequate at all times and processes are optimally adapted to current graduated energy pricing for maximum withdrawal.

The idea behind this is implemented in practice so that consumption peaks are reduced by intelligent, delayed activation of an individual large consumer. The GHM-ONE simulates the machine release according to a mathematical calculation. Because each machine has a small buffer tank, an elegant solution for dampening abrupt flow peaks in the system is achieved with a simple control valve that reduces the direct feed of the compressed air supply. The red curve in the graph shows the total volume flow - fluctuating between 55 and 20 m³/min during the 5-minute recording interval alone.

In a concrete case, a maximum compressor output of 65 m³/min was installed. However, this maximum output is no longer necessary thanks to the implemented harmonization. Therefore,

the system pressure could be reduced by 0.2 bar to 7.8 bar (1 bar corresponds to about 6 % lower costs). With a requirement of 35 m³/min for controlled operation, the old, calculated size of the compressed air accumulator could be reduced from 90 m³ by 15 to 20 m³ by means of delayed activation of consumers. The detected leakage indicated a loss of 0.4 to 0.5 m³/min per machine. After elimination of the causes, an additional profit of several Euro per shift. With energy costs of 2 ct/m³ and 13 machines in 3-shift operation total savings are nearly € 50,000 per year. Up to about 50 kW of heat output are available per hour for heat recovery, depending on the compressor.

The facility management of the overall compressed air system takes place via the GHM-ONE intelligent multi-function device of GHM GROUP. The graphic representation of the current energy management via trend graphics on the local display and simple communication with the mobile and stationary computers (MES, ERM) connected via the company network are the decisive factors. Not to mention the affordability of the investment.

Summary

Therefore, the GHM-ONE is a profitable solution for system equipment suppliers that can be tailored to the requirements of production plants and reliably supports the tasks of consultation, planning, installation, energy efficiency, maintenance, service and customer service. For the production plant, use of the GHM technology is a cost-effective and reliable implementation that transparently displays all machines and the compressed air supply system in the process sequence.

GHM Messtechnik GmbH is a leading specialist and full-range supplier for innovative measurement and control technology. With a global focus and passionate employees, the company develops and produces a wide range of more than 2,000 high-quality device types for all essential areas of industrial sensors and electronics.

The versatile portfolio comprises industrial electronics, industrial sensors, environmental measuring technology, water analysis, process measuring technology (hygienic design), state-of-the-art laboratory and handheld measuring devices and measurement data recording.

From the fusion of the Greisinger, Honsberg, Martens, Imtron, Delta OHM and VAL.CO companies, the GHM GROUP still considers itself a tradition-oriented company. With an eye on the vision of the founders, the company continues in its consistent efforts to permanently advance measuring and regulation technology with innovative developments and application-specific solutions.

The central focus is the bundling of technological expertise for development of customer-oriented solutions that are appropriate for the market and tailored to the high demands of industry and producing industry. In addition to long-term expertise and state-of-the-art production methods, the GHM GROUP offers competent application consultation and comprehensive customer service, high flexibility even for small part quantities, quick device adaptations and short delivery times. This is all offered at an outstanding price-performance ratio.

Publication free of charge.

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