

Retrofit with VAV solution and MP-Bus®:

Kiefer shows how it's done



Over the roofs of Stuttgart-Feuerbach:
The project managers at Gg. Kiefer GmbH: Thomas Lachenmayer, head of the Assembly and Customer Service department (left) and Nikolaus Kötzle, head of the MCR Planning department.

For the first time, Gg. Kiefer GmbH has used the Belimo MP-Bus for the new VAV system in their own building.

Nikolaus Kötzle, the man responsible for project planning, explains the reasons for this decision as follows:
"It soon became clear to us that we wanted to use VAV units with bus-capable controllers. During the corresponding preliminary talks, Belimo Deutschland also called our attention to the MP-Bus. Because we were interested in this, the product manager of the Swiss headquarters, Markus Keel, made an extra trip to Stuttgart. As a result of his well-informed advice, it became obvious that this solution, which had already been field-tested in other large projects, had enormous savings potentials."

This was also confirmed by Thomas Lachenmayer, the man responsible for implementation:
"Choosing the MP-Bus allowed us to kill two birds with one stone. On the one hand, we found a functionally and economically optimum solution for our own project. We were able to save at least 40% of the costs in cabling alone. On the other hand, the positive experience that we had with this – quasi experimenting on ourselves – enabled us to use this innovative technology in a profitable way for our customers in the future."



The extremely hot summer of 2003 brought it to light: the over 20-year-old VAV system in the rented section of the company building of Gg. Kiefer GmbH in Stuttgart could no longer ensure the desired room comfort. The existing system was therefore completely renovated within a very short time. As a pioneer in the field of ventilation technology, the builder was relying on an extremely innovative solution: 160 VAV units are linked via the Belimo MP-Bus® and can be controlled and monitored from the building automation system at all times.

The Kiefer building consists of two parts: The 4-storey administration building of Gg. Kiefer GmbH, which was constructed in 1974, and an equally large extension that was built in 1980 and is currently rented out. Both parts of the building have a separate ventilation system that was created at the time of their construction. Their sturdy technology is slowly getting on in years, however. This is true for the plant rooms and, above all, for the air distribution and individual control of the room climate.

Increasing comfort as investment protection

In the first renovation step, the VAV system (variable air volume control) in the newer building section was completely replaced. Ingo Kiefer, a member of the board of directors, explains the motivations for this as follows: "A balanced room climate is an important prerequisite for an optimum work environment. In the face of many empty office and commercial buildings, you have to offer tenants maximum comfort. As a leading supplier in the field of ventilation technology, we are also expected to have state-of-the-art systems."

In this sense, the renovation helped to increase the value of the property and protect the investments involved in the longer term. Another factor is of great importance: it must be possible to adapt the system to new uses at all times.

Thomas Lachenmayer, the head of the Assembly and Customer Service department at Kiefer, asserts: "The floor plans were occasionally altered in earlier times as well – only the room ventilation didn't know about it. This continually triggered complaints from the tenants. The new system is therefore much more flexible and has reserve capacities for subsequent expansion."



The building of Gg. Kiefer GmbH.



The existing ventilation plant room in the attic is still partially equipped with pneumatic actuators. These will now be gradually replaced by electrical direct coupled actuators from Belimo.

Project planning and implementation from one source

Gg. Kiefer GmbH designed and implemented the entire project with their own capacities. The MCR department under the leadership of Nikolaus Kötzle was responsible for the planning. According to his explanations, the following requirements had a high priority:

“To ensure the comfort of the tenants, it had to be possible to individually control the room temperature in the open-plan as well as in the individual offices and to continually adapt the temperature to the interior and exterior conditions. Furthermore, we wanted to reduce the operating and consumption costs.”

In order to meet these requirements as economically as possible, the new VAV system was linked via a central building automation system. For the whole thing to be optimally coordinated, all the components used had to be able to communicate with each other. “After testing different variants – even analog ones – we decided on VAV units with Belimo VAV-Compact controllers NMV-D2M that would be linked via the MP-Bus – for functional as well as cost reasons,” adds Nikolaus Kötzle.

VAV integration in the building automation system via the Belimo MP-Bus®



The VAV units from Trox are equipped with VAV-Compact controllers NMV-D2M from Belimo. They receive their setpoint values digitally, directly via the MP-Bus.

When the room climate is controlled with VAV units, the current room temperature for each zone is recorded by a conventional sensor that is connected to one of the VAV-Compact controllers NMV-D2M installed on one of the units via a Woertz cable adapter. This digitizes and transmits the actual value to the PCD2 controller in the control cabinet via an MP-Bus. There it is compared with the specified setpoint value. If necessary, the PCD2 triggers correction commands to the VAV controller so that the air quantities of the VAV units are adapted until the desired room temperature is attained.

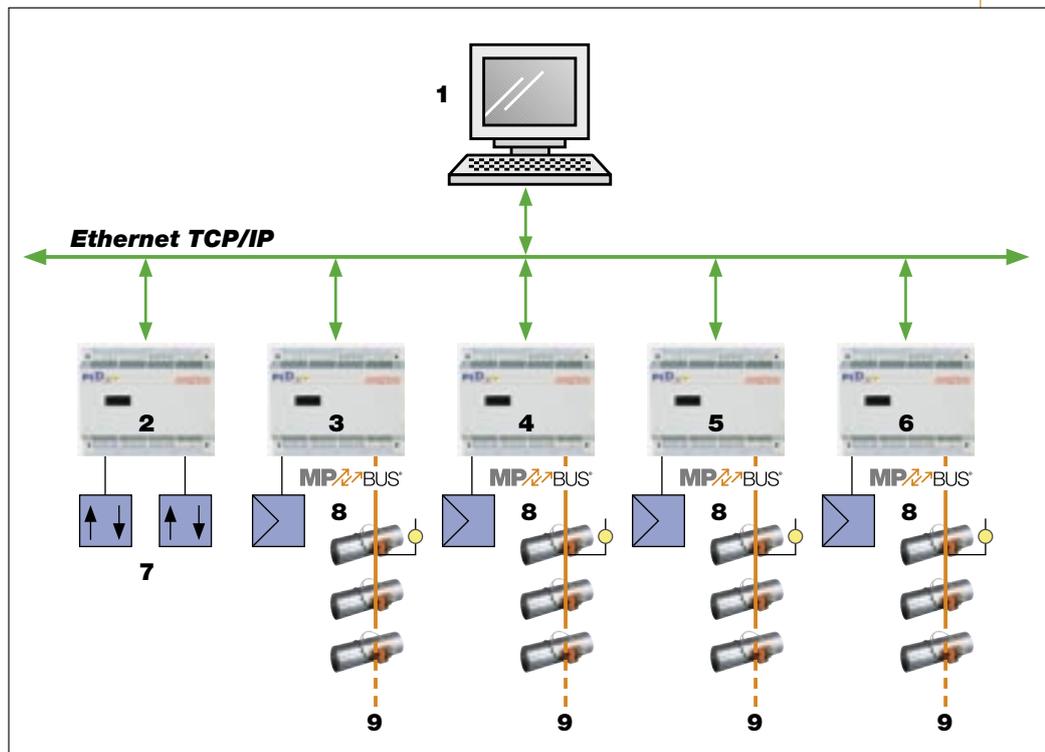
The PCD2 also adds up all the actual values and provides them to the primary air treatment plant as reference variables via Ethernet TCP/IP (fan controlled by frequency inverter). Each individual VAV unit can be called up via the building management system. The entered setpoint and current actual values can be checked centrally and corrected as needed. Zones with several VAV units receive a common setpoint value via the PCD2. In individual rooms with only one unit, this value is allocated through a single room controller via remote adjustment.



For each storey, one DDC controller of the PCD2-series with a MP interface from SAIA-Burgess operates 6 MP-Bus lines each, to which up to max. 8 VAV controllers NMV-D2M can be connected.



The building management system communicates with OPC (open connectivity via open standards) via TCP/IP. The manufacturer-neutral standard makes it possible to access each individual VAV unit directly via PCD2 and MP-Bus.



- 1) Building management system
- 2) PCD2 controller for primary air conditioning
- 3) - 6) PCD2 controllers for 1st to 4th floor

- 7) Analog and digital (inputs/outputs)
- 8) 6 MP-Bus lines
- 9) Max. 8 NMV-D2M per line

VAV units for individual room climate

The system concept uses the existing air conditioning plant in the attic. This conditions the temperature, pressure and humidity of the air and distributes it to all 4 storeys through air ducts. Each floor has an aftercooler and reheater for fine conditioning.

The storeys are divided up into different zones. Around 160 VAV units regulate the air circulation and delivery in the individual rooms. Completely equipped function units from Trox were selected for this purpose. "Their overall concept of mechanical structure, insulating shell and Belimo VAV-Compact controller completely convinced us. They not only ensure an optimum functionality but are also extremely quiet in operation. That also contributes to a pleasant working atmosphere – especially in the open-plan offices," is how Nikolaus Kötzle explains the choice.

The open-plan offices are equipped with several VAV units and the individual offices are equipped with one. They are placed in the hollow spaces of the suspended ceilings. The air is distributed via visible metal ceiling elements with integrated diffusers that were developed and manufactured at Kiefer.

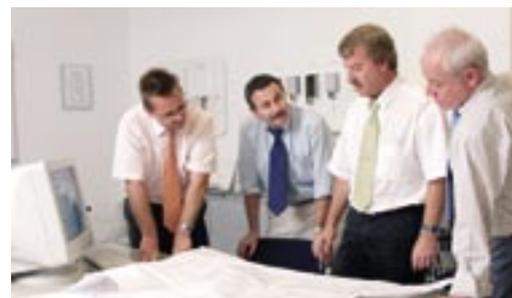
Time savings and high flexibility

Thomas Lachenmayer was responsible for implementing the project. He recounts, "The whole thing had to be realized under great time pressure. The removal of the old VAV units and the installation of the new ones, the cabling and the programming of the building management system was accomplished in only 6 weeks – and that during running operation and with minimum inconvenience for the tenants."

The networking via the MP-Bus made a significant contribution to this. This is confirmed by our conversation partner: "Because this allows up to 8 VAV units to be bundled and connected to the DDC controller together with one conventional sensor each, the cabling expense sinks dramatically. That not only saved us money but a lot of time as well – which was just as important in our case, you know."

6 bus lines were laid per floor. The overall capacity would be sufficient to integrate a total of 192 VAV units. "We therefore have a reserve capacity of over 30 units. This provides us with flexibility for future changes in the use of the rented premises. I mentioned at the beginning how important this is for us," Thomas Lachenmayer emphasizes again.

He also gets enthusiastic when he explains the advantages of networking with the building management system. "The programming was relatively simple. We assigned a logical address to each VAV unit. In this way, we could control them, monitor them and change the values if needed, individually from a central PC. In this way, users' wishes can be fulfilled more quickly. Even though you can never please everyone in open-plan offices, it is easier to find compromises that everyone can live with when the room temperature can be adjusted."



From right to left: Nikolaus Kötzle and Thomas Lachenmayer explain the concept and structure of the new VAV system to Belimo employees Markus Keel and Wolfgang Schlayer.

Key terms for MP-Bus technology



Multi-point technology:

The MP-Bus was developed as a simple actuator and sensor bus by Belimo. Up to 8 different HVAC control devices (air dampers, VAV units, fire dampers and control valves) can be combined via the 3 conductors of the MP-Bus and controlled as a bundled unit by an MP master.

Master-slave principle:

MP masters are PLC or DDC controllers with MP interface or Belimo "gateways" to fieldbus systems such as LonWorks® or EIB/Konnex.

Important note: Belimo provides the MP specifications to all interested manufacturers of DDC controllers, so that they can implement a corresponding MP interface in the hardware and software of their products.

Integration of analog sensors:

Conventional sensors (e.g. temperature or humidity sensors, switches etc.) can be integrated for each Belimo actuator via the MP-Bus. The actuator digitizes its analog signals and transmits them to the MP master via the MP-Bus.

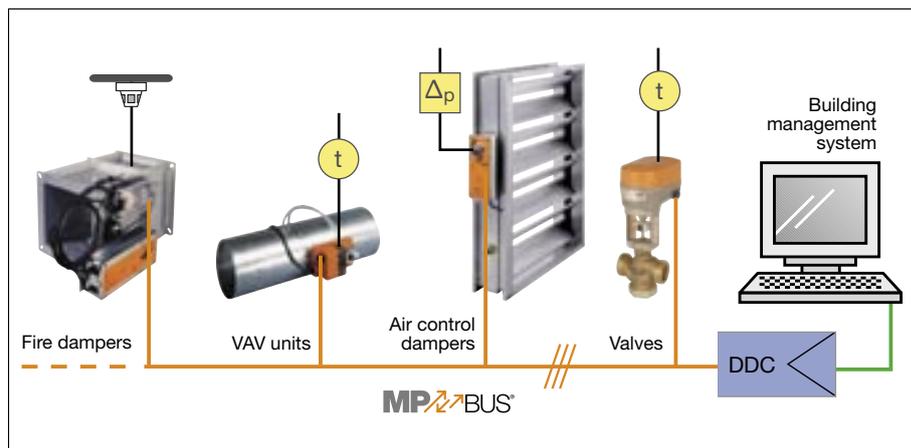
Minimum cabling expense:

The combination of several control devices in an MP-Bus reduces cabling expenses dramatically – up to 90%, as application examples show. The wiring does not require either special cables or terminating resistors. For cabling that is as efficient as possible, the multi-bus ribbon cable from Woertz is just the right thing: The connection between the ribbon cable and the round cable, for which a patent application has been filed, allows an interference-free installation in little time. The preassembly can already be done at the factory. The connection is then made at the construction site with a single "click" at any point.

Flexible conductor topologies:

The MP-Bus makes it possible to realize conductor topologies with a star, ring or tree shape as well as in mixed forms.

Further information: www.belimo.ch





The Belimo PC-Tool allows volumetric flows and trend records to be graphically displayed on a laptop and fault diagnostics and corrections to be performed in an easy way – either from the control cabinet or directly on site with the device.

Practical VAV PC-Tool

A further important aspect for the economic efficiency of the VAV system is its simple startup, diagnostics and maintenance. Kiefer uses the VAV PC-Tool developed by Belimo for this. This software program can be installed on a laptop and connected either to the DDC controller in the control cabinet or directly to the special diagnostic socket of the VAV-Compact controller NMV-D2M. "This makes it a portable tool for determining and checking the volumetric flow as well as for creating diagnoses, trend reports and startup or maintenance reports," says Thomas Lachenmayer.

The VAV PC-Tool has a whole series of easily understandable functions. The operating volumetric flows of each VAV unit are graphically displayed on the screen, either in m³/h or l/s. The VAV trend function records setpoint and actual values as well as the damper position in graphical form. It enables dynamic diagnostics of the VAV controller and – when the PC-Tool is connected for a long time – the creation of trend records of the function behavior and the room dynamics. The PC-Tool can also display the operating data saved in the controller on the screen. Any faults can be immediately recognized when tests are performed on site.

Successful all around

With this project, Kiefer GmbH has once again led the way in Germany. "The solution with Belimo VAV-Compact controllers and the MP-Bus completely convinced us – during planning as well as during installation," Nikolaus Kötzle and Thomas Lachenmayer summarize together. "We also have no doubt about the reliability of the chosen solution. For this reason, we will recommend the MP-Bus to our customers in the future – in the knowledge that we can completely rely on the support from the Belimo specialists for the implementation of further projects."

Gg. Kiefer GmbH, Stuttgart:

Pioneers in ventilation technology since 1877



All conversation partners together (from left to right): Nikolaus Kötzle and Thomas Lachenmayer, the men responsible for the project, Susanne Stauss, the head of Marketing and Advertising, the management board member Ingo Kiefer, as well as the two Belimo consultants Wolfgang Schlayer and Markus Keel.

Founded by the sculptor's son and ventilation pioneer Georg Kiefer in the small Stuttgart suburb of Feuerbach almost 130 years ago, the original machine factory quickly became one of the leading suppliers of ventilation technology in Germany. Exhausters, fans, as well as dust, water and oil collectors from Kiefer were already providing better health and working conditions in mills, foundries and other industrial businesses in the age of industrialization.

Gg. Kiefer GmbH is still a family-run enterprise today. The management board with the qualified engineers Lothar and Clemens Kiefer as well as business graduate Ingo Kiefer represents the 4th and 5th generation of the founding and owning family. The company employs around 120 people. They are active in Germany and other European countries as well as overseas.

In addition to classic plant construction, which is responsible for advice and planning with their MCR department, the Assembly and Customer Service department is responsible for implementation and maintenance. Furthermore, various ventilation components such as state-of-the-art slit, wall and displacement diffusers, chilled ceiling panels and the innovative concrete core activation CONCRET-COOL are developed in the internal development center. The wide range of products and services makes it possible to offer customers solutions from one source – from planning, through installation, and extending to maintenance. The capability of the company is confirmed by reference plants such as those at DaimlerChrysler Bank, Stuttgart, various locations of Recticel Automobilsysteme GmbH, Axa, Cologne or the Warsteiner brewery.

Further information: www.kieferklima.de

For more detailed information, please contact your Belimo representative: