

Belimo Energy Valve™ successfully used at Ludmillenstift hospital in Meppen, Germany

Intelligent Energy Valve solves long-standing hydraulics problems



Photo: Use Magazine



Photo: Ludmillenstift

The Ludmillenstift hospital in Meppen, founded over 160 years ago, has 17 specialist departments and 9 interdisciplinary centres with 400 beds. The hospital employs around 1300 people, including more than 130 doctors, who care for around 18 000 in-patients and 80 000 out-patients from all over the region every year. Around 40 million euros will be invested in refurbishment work, modification and construction of new buildings (a kindergarten, admin building and underground car park) by the end of 2015.

The Ludmillenstift hospital in Meppen/Germany is renowned well beyond the local area for its standard of medical care, state-of-the-art diagnostic and therapeutic technology and its pleasant atmosphere. However, a large number of modernisations over the years, in the form of extensions or modifications, resulted in problems in the hospital's hydraulic distributor circuits. These have finally been rectified through the use of Belimo Energy Valves™.

Time and again, the heating system's hydraulics used to be a major headache for the building services technicians. Several rooms and zones in the hospital, which covers approximately 50000 m², didn't receive adequate hot water, resulting in complaints about cold rooms. It was up to Günter Wilmink

and Kristian Fitzner, the installation and heating supervisors, to find a solution. Once the Belimo Energy Valves™ with in-built monitoring were fitted in the spring of 2013, the building services team was finally able to visualise the problems and gradually work its way through solving them.

The aim: hydraulics optimisation

Building type	Hospital
Project type	Renovation
Trade	HVAC
Belimo products	8 Belimo Energy Valves™
Commissioning	2013

Following a presentation by Belimo employee Rainer Frase detailing what the intelligent control valve could offer and how it works, they planned installation in the highly problematic distributor circuit 1. This supplies the individual buildings housing in-patients, a residential block for staff and a hotel for family members. A total of eight Energy Valves were installed in several zones in the spring of 2013 and linked to the existing Siemens building management technology via the BACnet/IP interface integrated as standard.

The challenge

Since there were hydraulic problems in the heating circuits, various departments and specialist areas on the large hospital site could not be guaranteed a supply of regular heat. Initial attempts to control the hydraulics using manually adjustable differential pressure controllers were fruitless. Pumps were also fitted, components were equipped with hydraulic deflectors, the feed temperature for hot water was raised to 90 °C and all pumps were set to maximum capacity. However, this resulted in more water flowing through the pipes, which exacerbated the hydraulic problems. In the areas most badly affected, the temperature difference between the hot water's feed and return was just 5 kelvins.

Huge increase in operating costs

These changes greatly increased the costs of pumping and gas consumption – including steam generation of around one million cubic metres a year – putting strain on the hospital's budget. Peter Meier, specialist in control technology at heating firm August Brötje KG (Bremen/Stuhr), has been assisting the hospital for around 10 years and recommended that the service technicians in Ludmillenstift take a look at the new Belimo Energy Valve™.



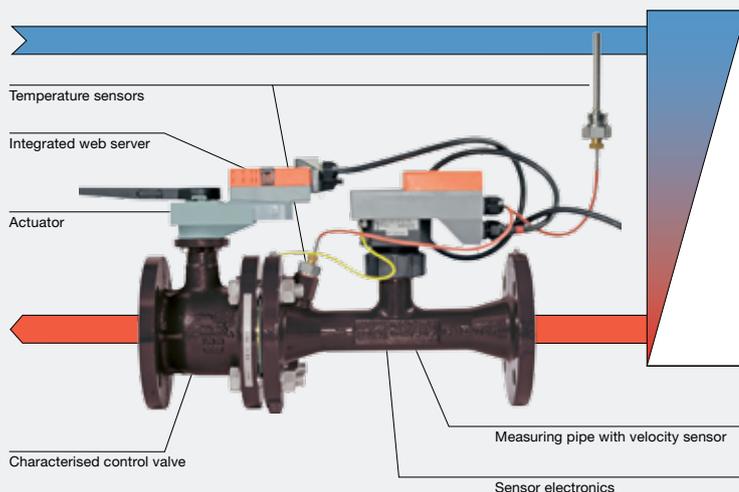
The hospital is also using proven Belimo products for the standard lift actuators



An Energy Valve and the status displays of five Energy Valves, displayed on building management technology

The two building services technicians are constantly delighted by a special feature in the Energy Valves whereby the integrated web server allows the current operating data (measured by an integrated measurement sensor for water mass flow and water temperatures) to be depicted with accuracy and accessed via a laptop or through building automation on a PC. At a glance they can now clearly see the temperatures, water and heat flows in each hydraulic circuit. A database, which stores this operating data, also enables the volumes of heat consumed to be assigned to rooms, zones or departments (cost centres) in the hospital.

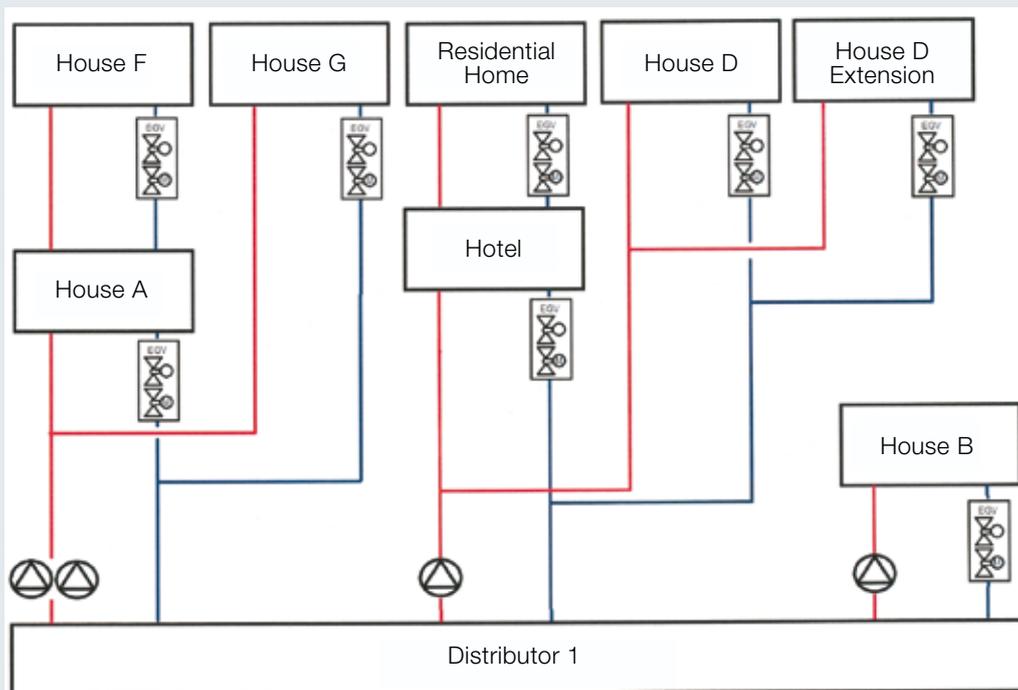
Characterised control valve, electronic flow rate controller and energy monitoring in a single valve



- Efficient control of flow rate and heat exchanger performance and monitoring of the delta-T value
- Automated hydraulic balancing by means of continual flow measurement
- Energy monitoring via integrated web server and BACnet IP, BACnet MS/TP or MP bus®
- Simple system optimisation through data analysis with the Belimo Energy Valve™ Tool
- Access to data and settings via the Internet
- Temperature range: -10 °C to +120 °C
- 11 sizes between DN15 and DN150

The Belimo Energy Valve™

The solution: Belimo Energy Valve™



Use of Energy Valves in each of the returns in the various supply lines on distributor circuit 1

The installation was a resounding success for everyone involved. The problems were recognised, localised and dealt with. The Energy Valves, set precisely for the systems on the basis of continuous measurements of water flow and water temperatures, have automatically controlled all hydraulic distributor circuits since being installed. All rooms and zones connected to distributor circuit 1 are therefore supplied with precisely the water and heat flows actually needed for heating purposes. This optimum hydraulic control using Energy Valves has enabled the amount

of circulated water used in the hospital to be reduced considerably. The maximum hot water feed temperature has also been scaled back to 75 °C.

Significantly reduced operating costs

The temperature difference between feed and return is now an optimum 15 to 20 kelvins. Several previously retrofitted pumps have been removed and it has been possible to significantly reduce the work of the hot water enhancers. This has translated into major savings in operating costs for the

hospital, which had not yet been quantified at the end of 2013. “Even after eight months of service we are still finding mistakes from the past in the complex hydraulic network. We need to fix them as quickly as we can”, says Wilmink.



On left in photo of return pipe: one of the eight Belimo Energy Valves™ installed in the Ludmillenstift heating circuit

The operator's thoughts on the Belimo Energy Valve™



Installation and heating supervisor Günter Wilmink is responsible for building technology at Ludmillenstift

“Investing in the installation of the Energy Valves along with the cost associated with upgrading the building management technology wasn't cheap, but it has fully paid off. The monitoring function of the Energy Valves in particular has been very useful in finding, analysing and rectifying weak spots. Working closely with the measurement and control specialist Peter Meier, we have managed to further optimise the individual consumer circuits and positively influence energy flows for a whole year.

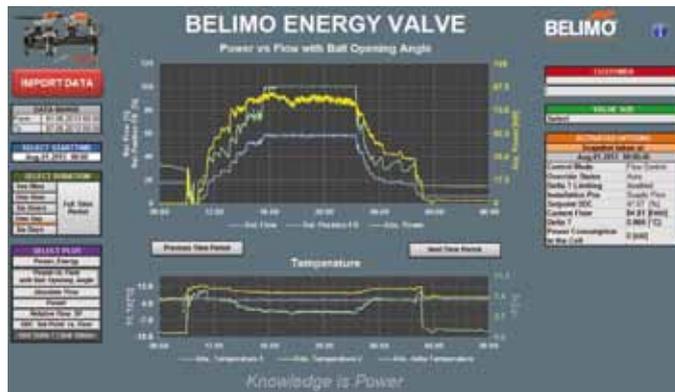
‘The Energy Valve has delivered fantastic results.’

What used to be problematic heating circuits have since been supplied perfectly and there are no longer any complaints about cold rooms. Given the results achieved from optimising distributor circuit 1, we will also be retrofitting circuits 2 and 3 with Belimo Energy Valves™. And we will also be using Energy Valves in the cold water networks, to which a refrigeration capacity of 300 kW is currently being added.”

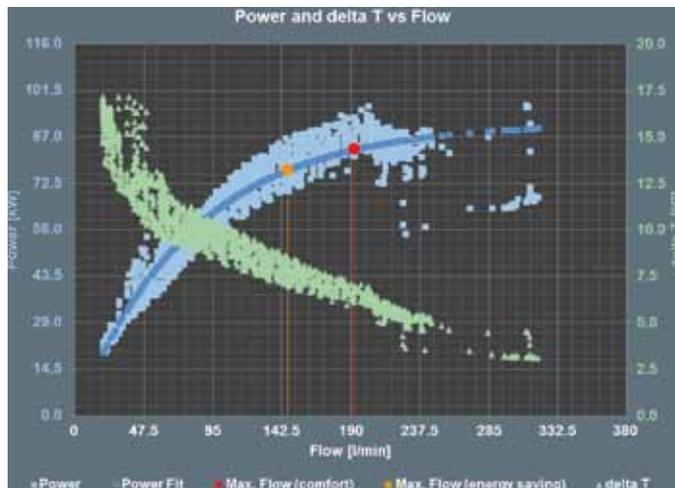
Data monitoring delivers energy efficiency

How the Belimo Energy Valve™ helps to save energy.

If the water flow in a heat exchanger is increased, energy transfer also increases up to a certain level of saturation. The saturation level in the energy flow diagram shows when the maximum rate of energy transfer is reached under the given situation conditions (water temperature and temperature, humidity and volumetric flow of air). To save energy, refrigerating machines and pumps should therefore generally never operate in the saturation zone. With the help of the Belimo Energy Valve™, this inefficiency effect can be avoided altogether as the Energy Valve Tool calculates the optimum delta-T value, which can be set in the valve and permanently monitored. This energy monitoring also allows the energy flows of an air conditioning system in the building to be analysed and future energy consumption to therefore also be predicted.



The Belimo Energy Valve™ Tool allows all data recorded by the Energy Valve to be imported and analysed. System stability, start characteristics, changes in water temperature and many other factors affecting energy consumption can be transparently visualised and optimised with the tool.



The Energy Valve Tool also enables the heat exchanger characteristics to be mapped and the level of saturation to be read off the performance curve (blue). To prevent even more water from being pumped through the heat exchanger, a minimum delta-T value can be set in the valve. This form of regulation helps to save energy and money.

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