Experience uninterrupted performance.

Belimo solutions for data centres

BELIMO

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The data centre market is evolving, with new GPU models requiring more heat dissipation than ever before. Hot and cold aisle containment strategies cannot extract enough heat for high-density racks. Belimo provides modern technologies for cooling data centres, facilitating the use of more efficient liquid cooling systems, offering better thermal conductivity and reduced energy consumption.

Chiller

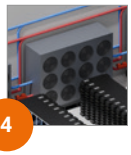
Central plants supply chilled water to the entire data centre. Due to the significant cooling requirements of modern data centres, this process demands high flow rates and, consequently, large-sized valves. Belimo butterfly valves, equipped with high-performance actuators, are perfectly suited for this application.

CRAC

CRAC stands for computer room air conditioning. A system designed to control temperature, air humidity, and air distribution within a data centre. Belimo's electronic pressure-independent valves (EPIVs) and Sensors are key components in CRAC systems ensuring the protection and reliable operation of sensitive IT equipment.

CRAH

Computer room air handling units (CRAHs) supply conditioned air to the white space within data centres. Electronic pressure-independent valves (EPIVs) from Belimo are key components in CRAH systems, delivering precise and reliable control of water flow.



Fan wall

Belimo damper actuators are vital components in fan wall systems, providing precise airflow control. Characterised control valves (CCVs) and electronic pressure-independent valves (EPIVs) manage water flow through the coils, ensuring efficient cooling and maintaining the required supply air temperatures.

AHU

An air handling unit (AHU) is a system used to circulate, filter, heat or cool air within a data centre. AHUs are also referred to as computer room air handling units (CRAHs). Energy Valves, electronic pressure-independent valves (EPIVs), damper actuators, and sensors from Belimo are key components.

Direct to chip (cold plate)

Direct-to-chip liquid cooling, is one of the most widely used methods for cooling servers with high thermal output, such as those utilised in high-performance computing (HPC), artificial intelligence (AI), and machine learning (ML) applications. The Belimo Energy Valve™ is ideally suited for this application.

CDU

Cooling distribution units (CDUs) supply chilled-water or water-glycol mixtures to cool heat-generating equipment such as servers. Belimo offers a comprehensive portfolio of characterised control valves (CCVs), electronic pressure-independent valves (EPIVs), and Energy Valves that are ideally suited for use in CDUs.

Rear-door heat exchanger

Accurate flow control is essential for the efficient operation of rear-door heat exchangers (RDHx). Electronic pressure-independent valves (EPIVs) and characterised control valves (CCVs) provide reliable and precise flow control, ensuring optimal performance of your RDHx system.

Immersion cooling

Belimo's electronic pressure-independent valves (EPIVs) maintain consistent flow to the coil, even where there are system pressure fluctuations. The Belimo Energy Valve™ continuously monitors supply and return water temperatures, calculates thermal energy, and delivers valuable insights to help track cooling performance.

Generators

Belimo fail-safe actuators are the ideal application for controlling the precise amount of combustion air required by these generators. The fail-safe ensures that airflow can be shut off immediately in the event of a fault.

Fire and smoke

Fire and smoke actuators from Belimo are essential safety devices designed to protect data centres from fire and smoke hazards.

Belimo products in data centre applications

The proper operation of a data centre depends on precise and constant control of ambient conditions. Belimo products – actuators, sensors and smart valves – ensure optimal control of air and water flow, guaranteeing energy efficiency, operational safety and continuous availability of critical installations. Designed for the most demanding environments, they facilitate the controlled and scalable thermal management of digital infrastructures.

Ventilation applications

Belimo damper actuators are designed for use in a variety of HVAC applications and guarantee reliability and reduced current consumption. They allow a wide torque range (from 2 Nm to 40 Nm), suitable for control damper sizes from 150 mm in size as well as direct mounting on standard control damper shafts. The actuators are suitable for control dampers, VAV end devices, fan coil units and many other HVAC applications.

Fail-safe actuators

Fire protection and smoke control applications – safety and protection

Fire and smoke damper actuators from Belimo are essential safety devices designed to protect data centres from fire and smoke hazards. These damper actuators are integrated into fire and smoke detection systems and control various mechanical components to prevent the spread of flames and smoke in an emergency.

Fire damper actuators

Butterfly valve
Applications: central installation, manifolds, open/close valves

Our butterfly valves with actuators have been specifically developed for heating, ventilation, and air conditioning applications, meeting all the requirements. They offer a wide range of options for various applications, including 2-way control and open/close applications with nominal sizes ranging from DN 25 to DN 700, as well as 3-way combinations for control and changeover applications with nominal sizes ranging from DN 100 to DN 300.

Butterfly valves with JR actuators

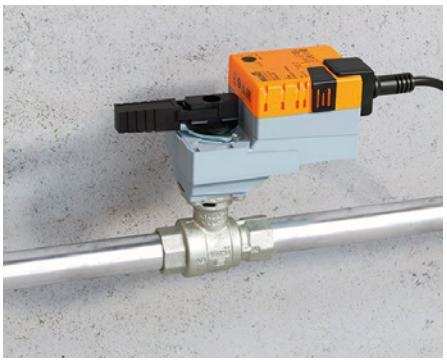
EPIV
Applications: CDU, RDHX, two-stage immersion cooling, CRAH, wall-mounted fans

Pressure-independent control valves provide precise control and automatic hydronic balancing, regardless of load level. Result: increased comfort, less consumption. Belimo provides a wide range to build detailed flow measurement and optimization for proven performance.

Electronic pressure independent zone valves (EPIV)

CCV
Applications: CDU, RDHx, wall-mounted fans, manifolds, open/close valves

Compact, heat-resistant and tight closing, the 2- and 3-way valves are motorised by energy-saving rotary actuators. The practice-proven ball valves from Belimo are fitted with characterised discs and guarantee a valve characteristic curve with equal percentage.



Characterised control valve

Sensors by Belimo, the perfect complement to actuators and valves

The sensors and thermal energy meters from Belimo meet the highest quality and reliability requirements. Using innovative technology ensures easy installation and seamless compatibility with all essential building automation systems.

Belimo offers a full product range of sensors for measuring temperature, humidity, pressure, CO_2, volatile organic compounds (VOC) and flow in pipe, duct and outdoor applications. The new room sensors, room operating units and energy meters are the perfect addition to the existing sensor product range. All products are backed by world-class service and support.

Seamlessly integrated, reliable and intuitive

Belimo sensors are the result of years of experience and HVAC expertise as well as our continuous focus on providing added value to our customers. The innovative design offers easy installation and seamless integration to ensure optimal system performance.

Seamless

Utilising innovative technology, sensors are designed to work with all major building automation systems ensuring optimised solutions in terms of performance and energy efficiency.

Reliable

The well-known high quality of Belimo guarantees reliable and accurate measured values over the complete life cycle of the building. The highly resistant sensors also carry a 5-year warranty and meet IP65/NEMA 4X requirements.

Intuitive

Installation and commissioning only take a few steps thanks to the well thought out design. The removable mounting plate also serves as a drilling template. Thanks to the specially designed snap-on cover and removable spring loaded terminal blocks, mounting is possible with hardly any tools.

Experience uninterrupted performance

Reliable

Flow rate assurance: By maintaining the required differential pressure across the rack, the Belimo Energy Valve™ ensures the necessary flow rate across each cold plate at all times – even during server maintenance.

Regulated quantity of water: The Energy Valve limits the maximum flow rate and thus prevents the erosion of the cold plate channels, caused by excessive flow velocities. This ensures uninterrupted operation.

Stand-alone system: With differential pressure setpoint configuration directly on the device, the Energy Valve can operate independently. This means that no external control signals are required.

Efficient cabling: The Energy Valve can be powered via Ethernet (PoE). You do not need an additional power supply; the installation process is considerably easier.

Scalable

Future-proof: The Energy Valve can be adjusted for changing cooling requirements without resulting in losses of performance for existing consumers. This ensures scalability as server capacity requirements increase.

Digital management: When servers are upgraded and require more cooling, the Energy Valve can be reconfigured via the building management system (BMS). This offers a new level of flexibility and adaptability options.

Efficient

Comprehensive data: Flow rate, differential pressure, cooling capacity, temperatures and much more are continuously monitored by the Energy Valve. Leverage this information to make proactive, informed decisions instead of merely reacting to problems as they arise.

Glycol monitoring: By monitoring glycol concentration in the system, the Energy Valve ensures optimal usage to maintain constant heat transfer characteristics. This promotes efficient and sustainable operation.

The correct flow rate at the cold plates at all times

Maintaining the proper flow rate across cold plates is essential for ensuring efficient cooling, system reliability, and the longevity of both the cold plates and the components they cool.

Effects of proper flow rate across cold plates

- **Server damage:** If the flow rate is too low, the server may not be sufficiently chilled, and damage may result. In severe cases, the server must be replaced in its entirety. This can result in costs amounting to EUR 100,000, or even up to EUR 250,000 for high-performance models.

- **Unplanned downtime**: Server freezes due to overheating can result in significant financial losses. According to Uptime Institute's 2022 survey, 70% of all outages cost USD 100,000 or more. In 25% of these cases, the costs even exceeded USD 1 million*.

- **Excessive flow rate risks:** Excessive flow rates can erode cold plates, thereby changing heat transfer properties and necessitating replacement. Additionally, excessive flow rates increase pumping energy consumption.

Challenges of providing constant flow rates across cold plates

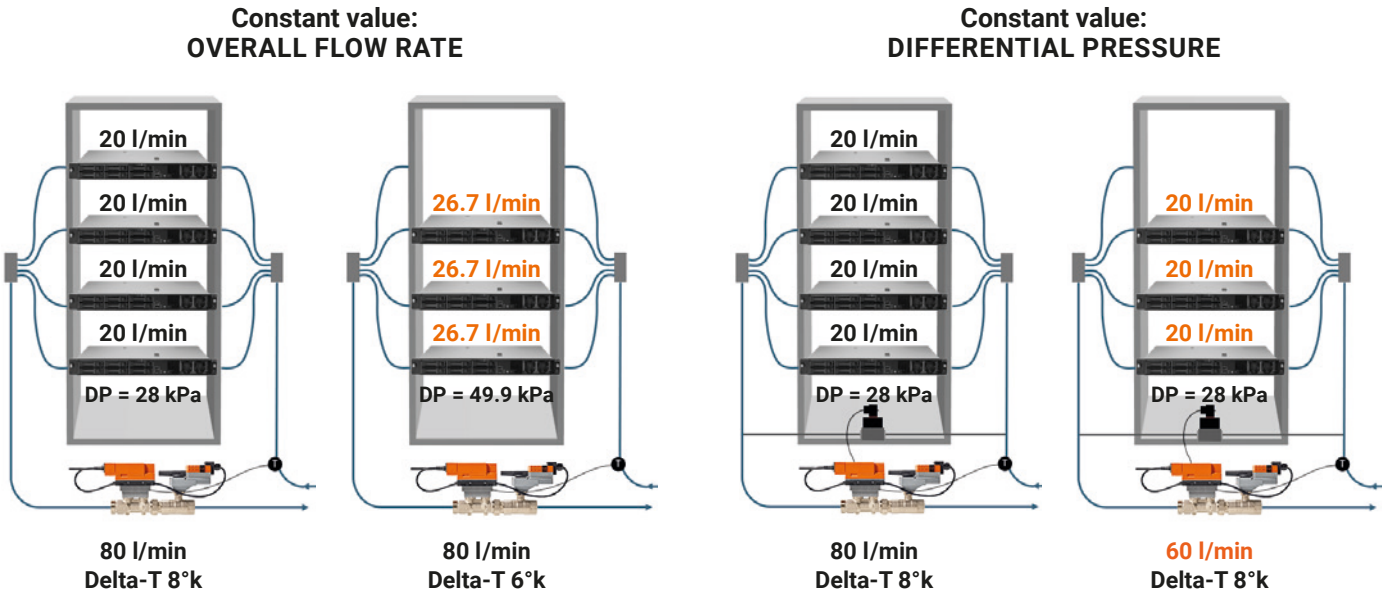
- **Dynamic environment**: Regular server removals for maintenance purposes change the total flow rate requirement for the rack. Excessively high flow rates for the remaining servers may arise as a result.

- **Flow rate distribution**: Uniform cooling distribution to the individual cold plates is of central importance. The solutions from Belimo ensure that the energy data are not only monitored but also actively controlled.

- **Variable server replacements**: Server upgrades or replacements may alter flow rate requirements. While conventional systems need to be adjusted manually in the event of changing server environments, the Energy Valve takes over this task autonomously.

*Uptime Institute Global Data Center Survey 2022
https://uptimeinstitute.com/resources/research-and-reports/uptime-institute-global-data-center-survey-results-2022

Using differential pressure to maintain constant flow



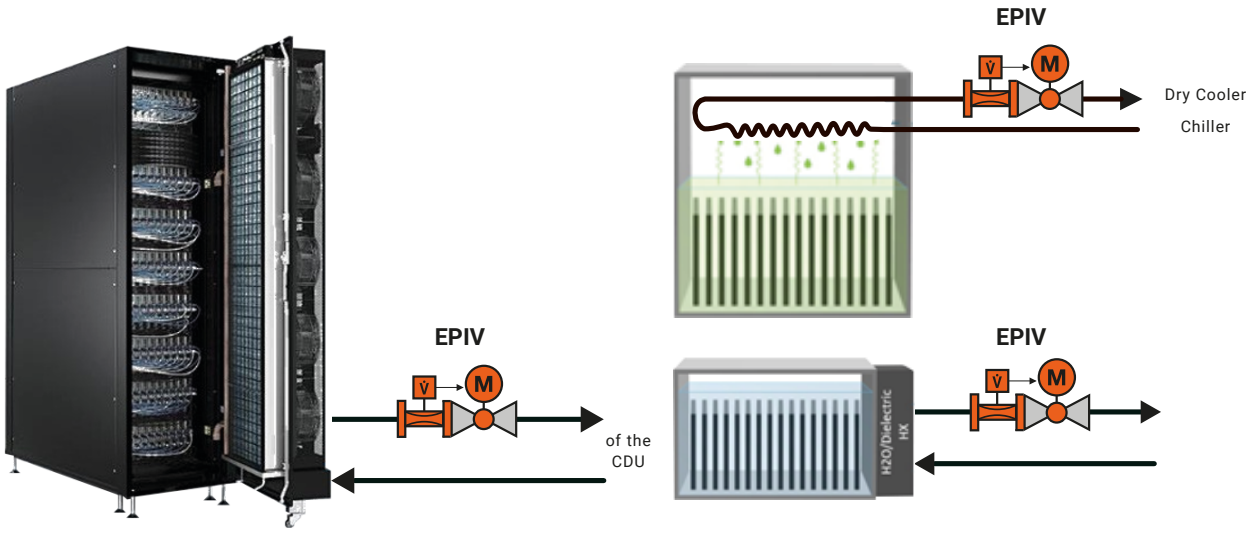
Practical example

The flow rates of the individual cold plates must be added together to determine the required overall flow rate for the cooling of the entire rack.

Situation 1: Constant flow rate
If a server is removed for maintenance purposes while controlling the overall flow rate, an excessively high flow rate will arise for the remaining cold plates.

Situation 2: Constant differential pressure
In contrast, maintaining a constant differential pressure across the rack ensures a uniform flow rate to each cold plate, even if a server is removed.

Air conditioning cabinet and immersion.



Practical example

Electronic EPIVs ensure dynamic balancing and flow control of each coil. They are generally integrated by the cabinet manufacturer at the factory.

- No energy loss, tight-closing valves
- Power control at all load levels, equal-percentage curve and pressure independence
- Ultra-precise flow control, calibrated ultrasonic flow meter

All inclusive

Belimo is the global market leader in the development, production, and sales of field devices for the energy-efficient control of heating, ventilation and air-conditioning systems. The focus of our core business is on damper actuators, control valves, sensors and meters.

Always focusing on customer value, we deliver more than only products. We offer you the complete product range for the regulation and control of HVAC systems from a single source. At the same time, we rely on tested Swiss quality with a five-year warranty. Our worldwide representatives in over 80 countries guarantee short delivery times and comprehensive support through the entire product life. Belimo does indeed include everything.

The "small" Belimo devices have a big impact on comfort, energy efficiency, safety, installation and maintenance.

In short: Small devices, big impact.

- 5-year warranty
- On site around the globe
- Complete product range
- Tested quality
- Short delivery times
- Comprehensive support

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