



# FLOW AND ENERGY MEASUREMENTS IN THE DATA CENTER



## Building Technology

“Flexim’s non-intrusive measurement technology enables us to precisely record the flow rates and energy flows in our air conditioning technology thereby further improving our energy efficiency.”



*Klaus Ruhmüller,  
Data Center Technology,  
Arvato Systems*



## Measuring Task

**Flow and energy measurements on the refrigeration and air conditioning systems of the two data centers at the Arvato site in Gütersloh**

Arvato Systems operates two data centers on the campus at the Bertelsmann headquarters in Gütersloh. Given the enormous power consumption of data centers, energy efficiency is extremely important for the operator. The biggest consumers are the IT systems themselves: The operation of servers, storage systems and networks accounts for more than half of the electric power consumption. The power requirements of the IT components are converted 100 percent into heat, which has to be dissipated to avoid overheating. Therefore, the largest part of the energy expenditure in the area of the data center infrastructure is accounted for by cooling.

The two Arvato Systems data centers at the Gütersloh site meet the most modern standards and have been awarded a “green star” as “Approved energy efficient data center” by the Eco Association for their holistic energy efficiency concept. The racks with the server and storage systems are alternately arranged in rows above a raised floor in such a way that cooler air is drawn from a cold aisle over the IT components, the waste heat is absorbed and fed back into a warm aisle. Due to the enclosure of the racks, an almost complete separation of warm and cold air is achieved and an air

short circuit is avoided. The cooling air is supplied via the raised floor and the air heated by the server is cooled via cooling coils.

The cold water quantities generated by the two cooling units and an absorber, as well as the cooling power, are recorded by permanently installed meters. However, how do you measure the power or energy consumption of individual consumers and how do you ensure hydraulic balancing of the cooling system? This is where the black case from Flexim comes into play.



## Solution

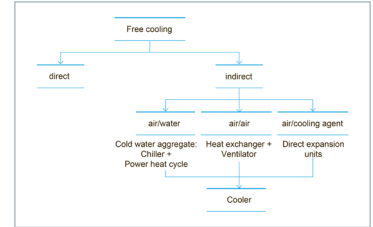
Arvato Systems has a portable clamp-on FLUXUS® F601 Energy ultrasonic system, which can be used to non-intrusively measure liquid flow rates and the thermal power of liquid-based consumers. The refrigeration engineers copied the trick with the non-intrusive acoustic measurement from the plant manufacturer, who had also checked the function of the installations he had carried out with a FLUXUS® F601 Energy.

Flexim's FLUXUS® measuring systems determine the flow rate using the transit time difference method with clamp-on ultrasonic transducers mounted on the outside of the pipe. In addition, the energy versions of FLUXUS® have temperature inputs. From the measurement of the temperatures in the flow and return, which is also carried out non-intrusively with clamp-on Pt100 temperature sensors, and the flow measurement, the measuring transmitter calculates the current output of the system, i.e. the heat flow, based on the enthalpy curves that are stored in the device for the various heat transfer media. Thanks to the integrated meter, the FLUXUS® F601 Energy can also be used as an energy meter.

The users at Arvato Systems particularly appreciate the ease of use, reliability and flexibility of their FLUXUS® F601 Energy. Regardless of whether it is a flow measurement of cold water in the raised floor or a power measurement on a cooling coil, with the portable ultrasonic system a flow or power and energy measurement can be set up in next to no time. Optimization of the hydraulic balancing immediately improves energy efficiency. Furthermore, the temporary measurements create transparency of consumption and lay the basis for further energy efficiency measures.



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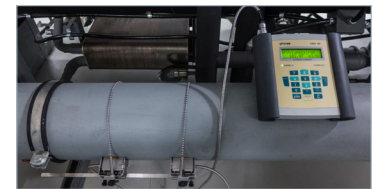


Overview of cooling options for data centre operations with (convection) air cooling

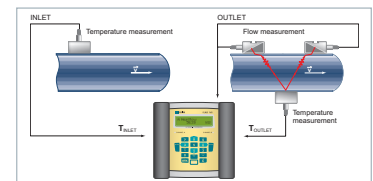
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Tips and tricks from the experts: Flexim field engineer Axel Dickfeld gives advice on the practical use of the clamp-on ultrasonic



Temporary flow measuring point on the absorption chiller



The FLUXUS® F601 Energy measures the energy withdrawn by the consumer by determining the amount of heat flowing into and out of the system (difference method).

## Measuring Points and Instrumentation

<b>Pipelines</b>	typically 2" to 12", steel, stainless steel, polypropylene
<b>Medium</b>	water, water glycol mixture
<b>Measuring Device</b>	1 portable clamp-on ultrasonic FLUXUS® F601 Energy flowmeter 1 pair of FSP1NZ7 clamp-on ultrasonic transducers 1 pair of Pt 100 clamp-on temperature sensors (paired and calibrated in accordance with DIN 1434-1) 1 wall thickness measuring head

## SELLING POINTS

- Quick set-up of temporary measuring points for reliable and accurate determination of flow rates, thermal output and energy consumption
- Extremely flexible measuring system: A single pair of transducers covers all of the pipe diameters 2" to 12".
- Temporary flow and energy measurements open up potential for optimizing the plant and operation

## Customer

### Arvato Systems, Gütersloh, Germany

As an internationally active IT specialist and multi-cloud service provider, Arvato Systems supports well-known companies in their digital transformation. More than 2,800 employees at more than 25 locations worldwide stand for high technical understanding, industry know-how and a clear focus on customer needs. As a team, we develop innovative IT solutions, bring our customers into the cloud, integrate digital processes and take over the operation and support of IT systems. As a part of the Bertelsmann-owned Arvato network, we have the unique capability to work across the entire value chain.

Our business relationships are personal; we work with our clients as partners, so that together we can achieve long-term success. [arvato-systems.com](https://www.arvato-systems.com)

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