

# Energy Efficiency - District Heating and Cooling

Precise and easy non-invasive ultrasonic  
thermal energy measurement

District heating and cooling

Combined heat and power (CHP)

Heating plants

Chiller plants

Submetering

Energy optimisation

Retrofits

Leak Detection

Energy performance of buildings

Energy Audits

ISO 50001

Energy Management System

**FLEXIM**

*when measuring matters*

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Measure, comprehend and manage thermal energy flows without interruption.

## With FLUXUS<sup>®</sup> Energy.

### Measurement technology from the market leader

FLEXIM's non-invasive ultrasonic flow and thermal energy meters not only set the standards in terms of reliability, durability and user-friendliness but especially in terms of accuracy.

Highly sophisticated signal filters, fast processing capacities and superior measurement algorithms make FLUXUS<sup>®</sup> Energy the state-of-the-art measuring solution even for the most challenging applications. FLUXUS<sup>®</sup> adapts itself automatically to the respective measurement conditions and compensates for disturbances such as high particle contents or structure-borne pipe noise. Extremely fast measurement cycles (every 10 ms) allow for precise real time monitoring of highly dynamic processes.

**All this makes FLUXUS<sup>®</sup> Energy unsurpassed in performance and the most capable non-invasive ultrasonic meter available on the market today.**

### Completely non-invasive and highly cost effective

The FLUXUS<sup>®</sup> Energy measuring systems are not only precise and reliable, but also highly cost effective. Not only the flow transducers, but also the clamp-on temperature sensors are individually matched and paired, enabling the highest possible accuracy without any drift. Being non-invasive minimizes installation costs, especially when retrofitting or upgrading existing heating and cooling systems.

Moreover, FLUXUS<sup>®</sup> Energy measures independently of the pipes dimensions, materials and the medium flowing inside — from water to heat transfer oils — every medium that is used in heating and cooling systems is stored in the meters database or can easily be added.

### Easily installed and universally applicable

Its incomparable flexibility makes FLUXUS<sup>®</sup> Energy the solution of choice for metering thermal energy flows. No matter it's cooling or heating systems, no matter how extreme the temperatures are and no matter how challenging the installation conditions prove, FLUXUS<sup>®</sup> Energy provides accurate, reliable and longterm stable measurements.

### Unique features:

Highly accurate measurement of thermal energy flows based on carefully paired and calibrated flow and temperature sensors (acc. to DIN EN 1434-1)

Unique FLEXIM signal processing for superior measurement accuracy

Highly durable and longterm stable measurement due to permanent pipe wall coupling and optimal mechanical protection

Applicable to all kind of pipe materials, media and temperatures (from -190 °C up to +600 °C)

Zero drift due to unique internal temperature compensation

Highly sensitive down to minimum flow velocities of 0.01 m/s

Tamper-proof storage of measuring data

Easy diagnostics and report generation by using the FluxDiag software



## Energetic optimisation of your buildings, plants and processes with FLUXUS® Energy

### Highly versatile

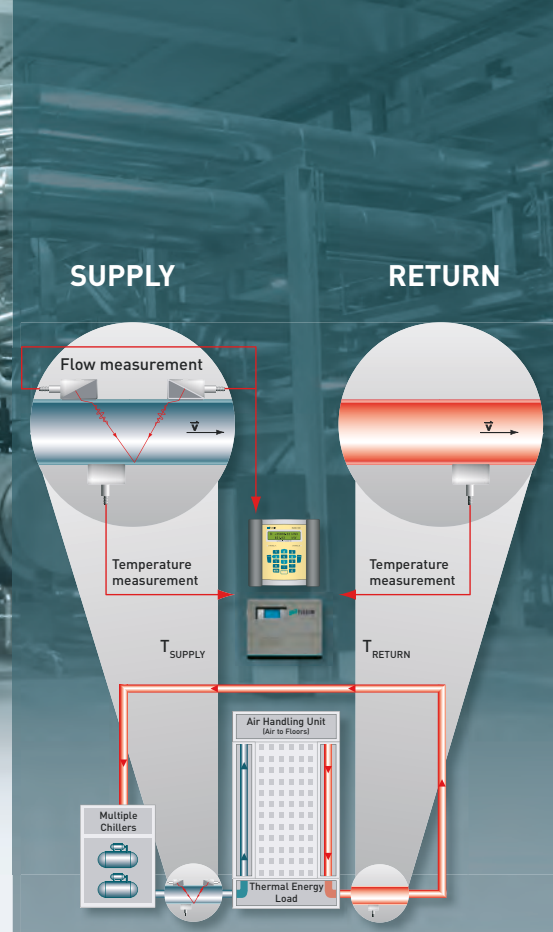
FLUXUS® Energy is available as either a permanent or a portable measuring system. Whereas the portable variants are often used for temporary measurements within the scope of energy efficiency campaigns and the implementation of Energy Managements Systems (EnMS) e.g. acc. to ISO 50001, the permanent variants are used for continuous consumption measurements.

### Fully integrated

FLUXUS® Energy consists of a fully integrated flowmeter and energy calculator in one handy device only requiring small installation space and making the installation itself very easy and user friendly. By eliminating the need for pipe cutting due to the measurement principle itself, the fully integrated system further saves valuable time and associated costs.

### Extremely sensitive

Most chiller or hot water systems are designed for peak loads with certain buffer capacity for security reasons or future plant development. This often results in low flow conditions, e.g. during night or at the weekends. Such low flow rates are often out of the measuring range of conventional metering technologies, such as magnetic meters, and thus unfortunately become non-revenue thermal energy. FLUXUS® Energy is able to accurately detect flow rates down to 0.01 m/s, which truly provides plant and building operators with the unique opportunity to avoid such losses.



### Applications:

Monitoring of chiller and hot water plants as well as subsequent sub-metering in:

- Universities
- Corporate and governmental buildings
- Shopping malls
- Hospitals
- Sport arenas
- Airports and others

Energy monitoring in industrial campaigns

Energy audits within buildings and production processes

Implementation of an Energy Managements System (EnMS) such as ISO EN 50001

Metering and verification of Energy Efficient Buildings





## Improve the Efficiency of District Heating and Cooling Systems with FLUXUS® Energy

The controlling, balancing and monitoring of thermal energy flows is of utmost importance in times of rising energy prices, environmental regulations and financial benefits of energy efficient buildings.

Whether in the boiler room of a university or in the central air-conditioning unit of a major airport — whether its for determining the energy consumption or to evaluate the efficiency of energy conversion processes — measuring points can be set up easily and non-invasively with the FLUXUS® Energy.

The non-invasive ultrasonic thermal energy meter FLUXUS® Energy provides the most economic system solution without diminishing any measurement performance, independent of the pipe size, material and medium flowing inside.

**FLUXUS® Energy is ideally suited to monitor and meter heating and chiller plants flow rates, detect potential leaks within distribution networks or act as a sub meter at large customers.**

### Highly cost effective

In direct comparison to conventional inline metering technologies, FLUXUS® Energy does not cause any costs associated with pipe cutting, system shut-down and associated draining and line refilling activities.

Specially designed transducers and mounting fixtures simplify the installation process and ensure best insulation effects.

### Install and forget

FLUXUS® Energy is virtually maintenance free. Once installed there is no need for regular inspection. As the transducers are carefully matched, calibrated and feature an internal temperature compensation, there is no potential for drifting measurement values and incorrect readings. This is especially important when it comes to detecting minimum flows occurring at night times or when having small leaks.

### Smart metering

Far beyond the function of a totalizer, FLUXUS® Energy provides real time measurement recordings of all possible parameters such as thermal energy rates, volume flow, flow velocity, medium temperature, etc. The enriched diagnostic information helps customers to understand what happens at the individual measurement point.



## Empire State Building goes green

The Empire State Building is the first prebuilt commercial building in New York City to achieve LEED Gold certification. A few years ago, the owners of the building saw the need for a complete environmental renovation, calling together a team of private companies and public organizations to establish eight initiatives on how to increase the energy efficiency of the building and optimally balance financial and environmental returns on the investment.

In addition to improved windows, insulation, and lighting, the HVAC retrofits and their monitoring were the biggest points in the building's renovation.

For performance monitoring of the chillers, pumps and water distribution system, Johnson Controls, being responsible for the Metasys Building Management System, selected FLUXUS® Energy meters due to their high accuracy under very tight piping spaces as well as the fact that they are non-intrusive and eliminate the need to cut into piping for installation.

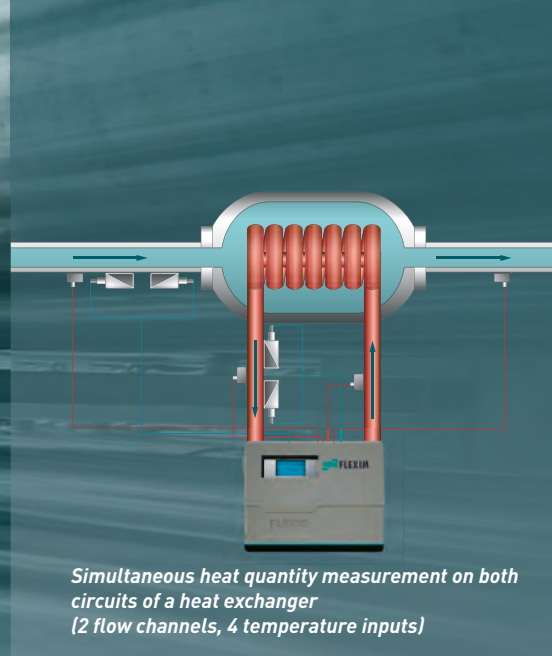
### Advantages:

High accurate thermal energy measurement in areas with restricted pipe space

Data transfer via BACnet to the BMS, also enabling submetering tasks throughout the building

No need for pipe work during installation

Virtually maintenance free metering system



*Simultaneous heat quantity measurement on both circuits of a heat exchanger (2 flow channels, 4 temperature inputs)*

## Establishing your Energy Management System

In the industrial sector, energy has long been a key competitive factor. Clamp-on ultrasonic measurement with FLUXUS® Energy also offers impressive and unique solutions which can be used to tap efficiency potential non-invasively.

Energy use on an industrial scale often goes hand in hand with particularly challenging conditions for people and technology. But, regardless of whether they are installed in hazardous areas as well as at extreme temperatures (from -190 °C to over +600 °C), permanently submerged under water or on the smallest and largest of pipes –

**FLUXUS® Energy ultrasonic systems have proven themselves in the most demanding applications:**

- Efficiency monitoring on heat exchangers in line with preventative maintenance
- Comparison of the amount of energy produced and primary energy used in boilers and burners
- Permanent monitoring of thermal energy flows
- Quantification and use of residual heat
- High temperature flow measurements of heat transfer oils or molten salts

## Monitoring of Combined Heat and Power Plants

Combined Heat and Power (CHP), or cogeneration, is gaining a widespread popularity and use in buildings as of its ability to reduce costs, increase efficiency, and provide power independence.

To promote the use of CHPs, governments are providing numerous financial incentives. Many of these incentives require metering and verification take place before and after a CHP is installed.

Metering is needed prior to a CHP installation to establish a baseline, determine peak demand, and properly size the CHP, ensuring that it will run at its greatest efficiency. Furthermore, metering is essential after the CHP system is installed to verify accurate savings.

It is a very challenging task to measure the thermal energy flows in CHPs, as it involves high temperature conditions and various types of heat transfer fluids within a harsh environment. FLUXUS® Energy provides an elegant, precise and reliable solution for both new and existing CHPs helping to fulfill governmental requirements and optimising their operation.

## Tasks of FLUXUS® Energy

District Energy, Operations, Distribution and Building Loads

Monitor usage for billing

Metering and Verification for “Green Building” certification

Building Oversight Management Systems

Load Balancing

Submetering

Energy Optimisation

Energy Audits

Metering & Verification

Retrofit

Billing

Water Control / Leak Detection

Demand Response

Combined Heat and Power (CHP)



# FLEXIM

More than 25 years of experience  
in clamp-on ultrasonic metering



## Technical Data

|   |  |
|---|--|
| <b>FLUXUS® Energy:</b>                    | Fully integrated permanent or portable thermal energy metering system. Calculation per EN1434 (ultrasonic clamp-on transit-time flow measurement, temperature measurement with clamp-on or insert temperature sensors)       |
| <b>Quantities of measurement:</b>         | Instantaneous thermal power output (Thermal Energy Calculation as per EN1434), totalized thermal energy, volume and mass flow, temperature $T_s$ , $T_r$ , $\Delta T$ , flow velocity, liquid's sound speed, signal strength |
| <b>Units:</b>                             | W, Wh, J, J/h, BTU, BTU/hour, Tons, Tons/hour, etc .   |
| <b>Flow velocity:</b>                     | 0.01 to 25 m/s   |
| <b>Repeatability:</b>                     | 0.15% of reading $\pm$ 0.01 m/s  |
| <b>Accuracy, volume flow*:</b>            | factory calibrated: 1.2 % of reading, $\pm$ 0.01 m/s<br>field calibrated: 0.5% of reading, $\pm$ 0.01 m/s **   |
| <b>Accuracy, temperature measurement:</b> | $\pm$ 0.15 °C with matched clamp-on RTDs (Class A, EN1434 compliant)<br>Types: Pt100 / Pt1000 clamp-on and insert sensors, Construction: 4-wire Platinum RTD   |
| <b>Integrated data logger:</b>            | typically stores 2 years data at 15 min storage rate   |
| <b>Outputs types:</b>                     | Analog: mA, V, pulse, frequency  |
| <b>Communication:</b>                     | RS485 (for portable unit),<br>Modbus RTU/485, Modbus ITCP, BACnet/IP, MBus, MSTP, HART (further protocols available on request)  |

\* under reference conditions and with  $v > 0.15$  m/s

\*\* if reference uncertainty better than 0.2%

For more information, see the corresponding technical specifications.