Frese DELTA T Control System

The simple and efficient way to maximise energy savings

Frese

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ΔT Measurement & Control

Frese at the heart of flow control

Frese

Innovative solutions from Frese balance global HVAC systems accurately and efficiently. From cooling systems in the Middle East to heating systems in Scandinavia, our products transform state of the art technology into everyday solutions.

Over 25 years' experience producing dynamic balancing solutions, has positioned Frese as the leading manufacturer of energy saving valves and through our commitment to innovation, we continue to be at the forefront of technological advancements in our areas of expertise.

To support our products, the knowledge, experience and dedication of our employees and partners ensure our solutions are applied correctly to maximise savings and position Frese as the authoritative voice for pressure independent and dynamic solutions.

The simple and efficient way to maximise energy savings

The Frese DELTA T Control System is an easy-to-use solution for measuring, monitoring and controlling the ΔT between the inlet and outlet of a terminal unit to maximise energy savings.

Function of the Frese DELTA T Control System

The DELTA T Control System measures and monitors the actual ΔT of the coil and using the Frese DELTA T Control Unit and the DELTA T temperature sensors, maintains the minimum set point ΔT.

The set point ΔT is set using the design ΔT figure found in the coil data sheet.

When the water flow through a terminal unit exceeds the flow where the energy from the water can be efficiently transferred to the building, the Power Saturation Point* of the coil is exceeded and the ΔT drops below the design value for that terminal unit. This is overflowing the coil.

Overflowing the coil consumes extra pump energy and lowers the efficiency of the chillers or boilers. To avoid overflowing the coil, the Frese DELTA T Control System reduces the flow through the control valve, thereby increasing the ΔT of the coil until it is restored to the minimum set point ΔT value.

* Power Saturation Point of the coil - the point beyond which the coil cannot produce additional power transfer regardless of increased flow

Flexibility

The Frese DELTA T Control System can be used in both heating and cooling systems to optimise and maintain the inlet and outlet temperature difference of a fan coil unit or air handling unit.

It can be installed in new build projects, typically with the Frese OPTIMA Compact PICV, or it can be easily retrofitted to existing systems, with existing valves, without any interruption to the system operation.

Technical Data

Frese DELTA T Control System

DELTA T Control Unit Material:	ABS and Polycarbonate
DELTA T Temperature Sensor Material:	ABS
Protection Class:	IP 24 to EN 60529
Supply:	24V AC/DC
Maximum Power Consumption:	4 VA
Power Consumption:	1,5 VA
Control input/Output Signal:	0-10V DC
Feedback Signal:	0-10V DC
Ambient Operating Conditions:	5°C to 50°C 20-90% RH

The Importance of Achieving Design ΔT

Achieving design ΔT is critical for overall system efficiency and particularly for plant room performance.

To ensure the return temperature from the secondary side to the primary side of the building is as designed (and therefore the ΔT is as designed), the energy transfer at the coils on the secondary side must be achieved. Consequently, coil performance is important to achieving design ΔT and overall system efficiency.

Coils perform at their most efficient point when the temperature difference (ΔT) between the flow and return water to and from the coil is at the design ΔT of the coil (published by the coil manufacturer).

- Increasing ΔT means a decrease in required flow rate for a given load
- A decrease in flow rate means a decrease in pump energy

Poor ΔT performance requires additional flow to serve the heating or cooling load which leads to excess equipment being run, loss of capacity, wasted energy and system instability

Benefits

- Energy saving through the control of the optimum ΔT in the system
- Provides optimal efficiency for chillers and boilers
- Release additional flow capacity
- Simple installation between the BMS and the 0-10VDC modulating actuator
- Quick and simple to set
- Can be retrofitted to an existing system without any interruption of the operation

Features

- Easy to use buttons for setting the optimum ΔT set point
- Automatically detects whether the Control System is installed in a heating or cooling system
- Temperature sensors can be mounted on pipe dimensions from DN15 to DN300











Case Study

Technical University of Denmark (DTU) - Lyngby Campus

The University was founded in 1829 and today is among the top universities in the world and is ranked No. 1 in the Nordic region on the 2011/2012 Leiden Ranking of 500 major universities.

Established in 1960, DTU's main campus located north of Copenhagen near the town of Lyngby, consists of more than 100 buildings and covers an area of 106 hectares. With approximately 9,000 students and 5,500 staff, DTU is currently investing more than DKK 4 billion in its campus development to create optimum conditions for research and education with state-of-the-art facilities.

Background

The DTU Lyngby campus is served by a district cooling network providing cooling for laboratories, data centers and classrooms.

As, **more buildings have been added** to the campus over the years, the capacity of the cooling network has not been developed to meet the extra demand. Consequently, the **cooling capacity of the current system has now reached its limit**. DTU have been considering a number of options to try and **increase the capacity** of the cooling system, including upgrading and upsizing the distribution pipework.

Issue

During the investigation phase poor ΔT within the system was identified as part of the capacity problem. The district cooling system has a **design ΔT of 6°C**, but many buildings were found to be running with an **actual ΔT of between 1 and 3°C**.

Case Study

Situation

A laboratory building was selected as the test site for the Frese DELTA T Control System and within this building, the freezer room which houses multiple -80°C freezers. The freezers expel large amounts of heat in to the room and the room temperature is controlled by two fan coil units.

The water flow to the fan coil units is controlled by a DN15 static 2-way control valve and 0-10V modulating actuator and the room temperature is stable at 21°C

The first phase of the study was to measure and monitor, for a period of one week, the current ΔT being achieved with the current installation setup.

The Frese DELTA T Control System can be used as a diagnostic tool, as well as a control system, to collect and analyze data from existing systems.

In this phase of the study there is no control of the ΔT. The control unit monitors the BMS control signal and the flow and return water temperatures to and from the fan coil.

The second phase was to use the DELTA T Control System to monitor and control the set point ΔT for the same installation.

Two fan coils


DELTA T temperatur sensors

DELTA T control unit

Results

The study compared the performance of a static 2-way control valve, both with and without ΔT control on the same fan coil unit.

When using ΔT control and for the same average power output from the coil of approximately 5.8 kW, the average flow is **lower** and the coil ΔT is **higher**.

		Flow (l/s)	ΔT (°C)	Coil Power (kW)
2-Way Valve with ΔT Control	Average	0.27	5.1*	5.8
2-Way Valve Only	Average	0.44	3.1	5.7

*Set point ΔT set at 5.0°C due to undersized coils

Conclusion

Main benefit

When fitted with Frese DELTA T Control System the same FCU, controlled by a Static 2-Way valve, can satisfy the same cooling load with **77% less pump energy consumption**.
(*Calculated using the pump affinity laws and cubic relationship between flow and pump energy*)

Additional benefits

By reducing the flow that was required to maintain the desired room temperature, **additional flow capacity is also released** in the overall system.

Increase in **plant efficiency** as a result of the terminal unit operating closer to it's design set point ΔT.

Energy Saving
77%

KNOWLEDGE

QUALITY

INNOVATION

MANUFACTURING EXCELLENCE

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