

## Frese DELTA T Control System

### Description

The Frese DELTA T Control System is an easy-to-use solution for measuring, monitoring and optimizing the  $\Delta T$  between the inlet and outlet of a terminal unit, in order to increase the system efficiency and reduce pump energy.

### Operation

The DELTA T Control System measures and monitors the actual  $\Delta T$  of the coil.

If the  $\Delta T$  is equal to or higher than the set point, the Frese DELTA T Control System will not change the input signal to the actuator and the flow will be according to the BMS input signal.

If the  $\Delta T$  is lower than the set point, the Frese DELTA T Control System will lower the input signal to the actuator and thereby decrease the flow through the control valve until the set point  $\Delta T$  is reached.

### Application

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

### Benefits

- Energy saving through the control of  $\Delta T$  in the system.
- Provides optimal efficiency for chillers and boilers.
- By reducing the required flow to achieve the system  $\Delta T$ , additional flow capacity can be released.
- Simple installation between the BMS and the 0-10VDC modulating actuator.
- Quick and simple to set up.
- Can be easily retrofitted to an existing system.



### Features

- Easy to use buttons for setting the optimum  $\Delta T$  set point.
- Automatically detects whether the Control System is installed in a heating or cooling system.
- Temperature sensors can be mounted on a variety of pipe dimensions from DN15 to DN300.
- To avoid starving the coil of flow the DELTA T Control System is programmed so it never sends a voltage signal to the actuator of less than 2.0 V. This means that the DELTA T Control System does not close the valve fully even if the measured  $\Delta T$  is below the set point. The BMS can always close the valve.
- 0-10 V DC feedback signal for monitoring the terminal unit operation.

## Frese DELTA T Control System

### The Importance of Achieving Design $\Delta T$

Achieving design  $\Delta T$  is critical for overall system efficiency and particularly for plant room performance.

The return temperature in the hydraulic system is depending on all Fan Coils or other terminal units are achieving the system design  $\Delta T$ . Consequently all coils must be prevented from overflow, to achieve design  $\Delta T$  and overall system efficiency.

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

- Increasing  $\Delta T$  means a decrease in required flow rate for a given load.
- A decrease in flow rate means a major decrease in pump energy consumption.

### Function of the Frese DELTA T Control System

The main function of the Frese DELTA T Control System is to measure and monitor the actual  $\Delta T$  of a coil and ensure that the actual  $\Delta T$  will never be lower than the  $\Delta T$  set point.

When the water flow through a terminal unit exceeds the flow at which the energy from the water can be efficiently transferred to the building, the Power Saturation Point\* of the coil is exceeded and the  $\Delta T$  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 and coil, thereby increasing the  $\Delta T$  of the coil until it is restored to the set point value.

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

### Setting the Optimum $\Delta T$ using the Frese DELTA T Control System

The Frese DELTA T Control System runs with a standard (default)  $\Delta T$  of 5.5 °C for cooling.

Every coil has a design  $\Delta T$  which is given in the data sheet for the relevant coil.

If required, the default  $\Delta T$  setting of the DELTA T Control Unit can be manually overridden and set to the design value.

To set  $\Delta T$ , press and hold the OK button **(2)** for minimum one second. The set point  $\Delta T$  value is changed by the buttons **(1)** and confirmed by the OK button **(2)**

The display **(3)** will change between the actual  $\Delta T$  value and the set point  $\Delta T$  value. When the set point  $\Delta T$  is shown in the display, the green LED **(4)** will be on.

The controller auto-detects and indicates with the red or blue LED **(5)** whether it operates in heating or cooling systems.



Frese DELTA T Control Unit

# Frese DELTA T Control System

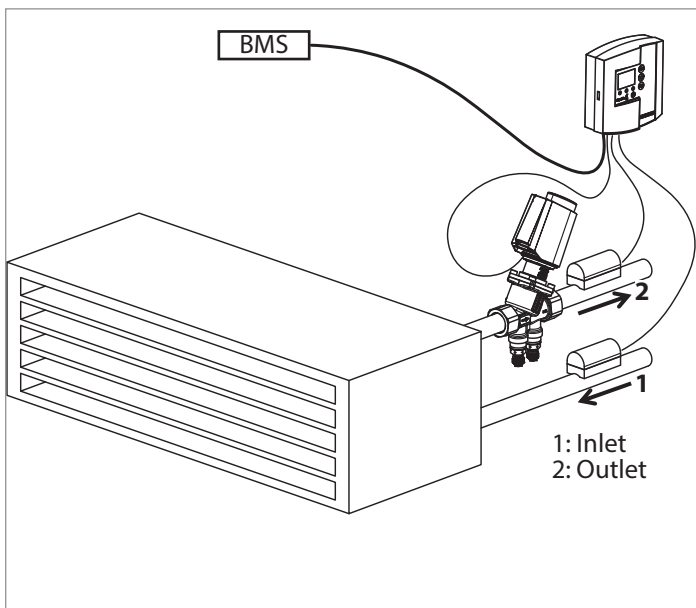
## Installing the Frese DELTA T Control System

The Frese DELTA T Control System offers installation flexibility. It can be retrofitted to existing systems with ease and minimal disruption, or installed directly into new systems.

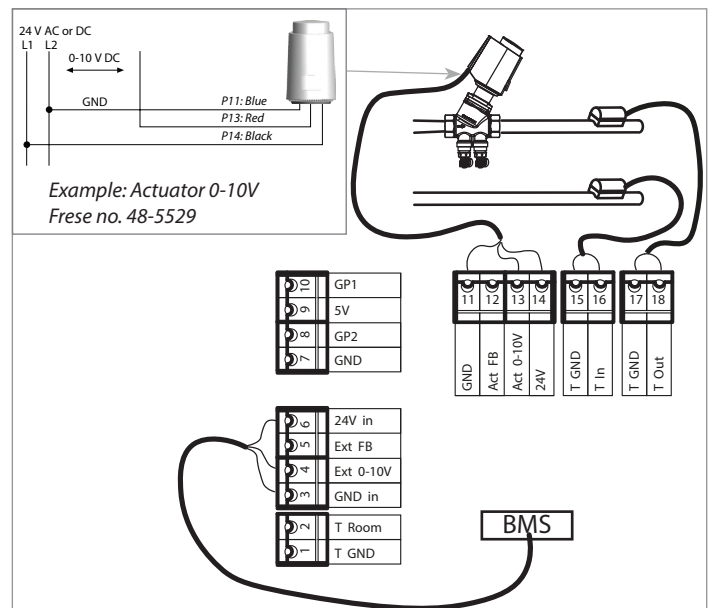
The example below shows the Frese DELTA T Control System installed on a terminal unit with the Frese OPTIMA Compact pressure independent control valve.

**Please note:**

- Frese DELTA T Control System must be connected to the actuator of the valve.
- It requires an external control signal of 0-10V from a BMS system or a room thermostat.
- The actuator must fully open the valve at 10V and close it at 0V.
- If the external signal is less than 2.0V it is transferred unchanged to the actuator, regardless of the measured temperature. This enables closing the valve completely when no flow is needed.
- Insulation can be placed over the temperature sensors.
- Temperature sensor cables must be the same length.
- Temperature sensors must be a similar distance from the coil and as close as possible.
- Temperature sensors can be mounted and wired without taking the colour of the cord into consideration.

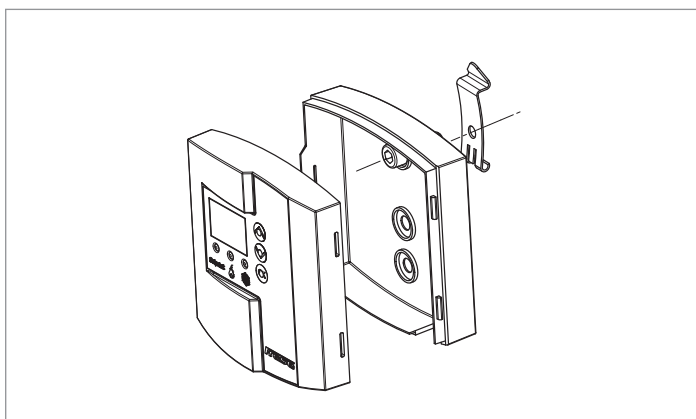


Frese DELTA T Control System mounting

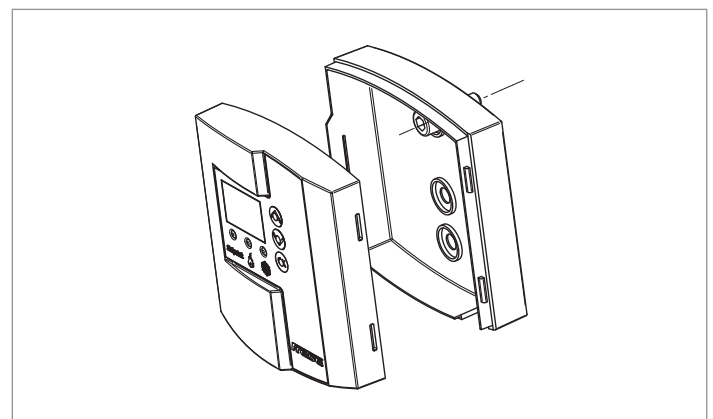


Frese DELTA T Control System electrical wiring

The Frese DELTA T Control Unit can be mounted on a DIN rail using the DIN rail clips or directly on the wall.



Frese DELTA T Control Unit mounted with DIN rail mounting clips



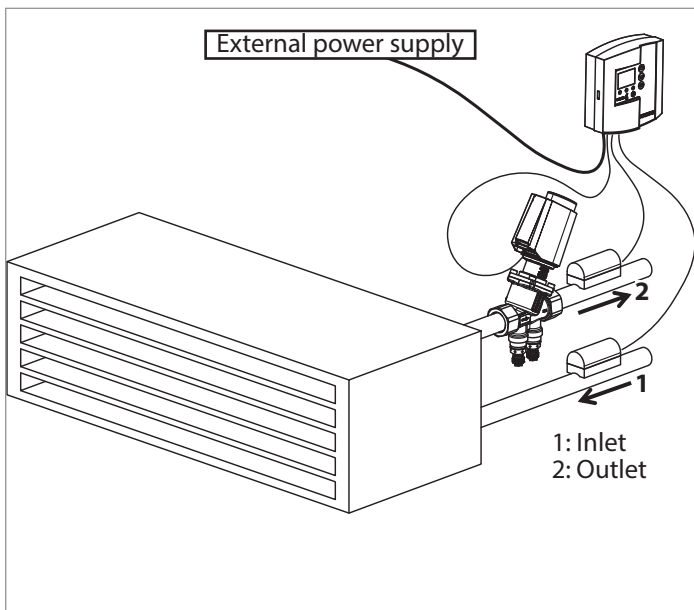
Frese DELTA T Control Unit mounted on a wall

## Frese DELTA T Control System

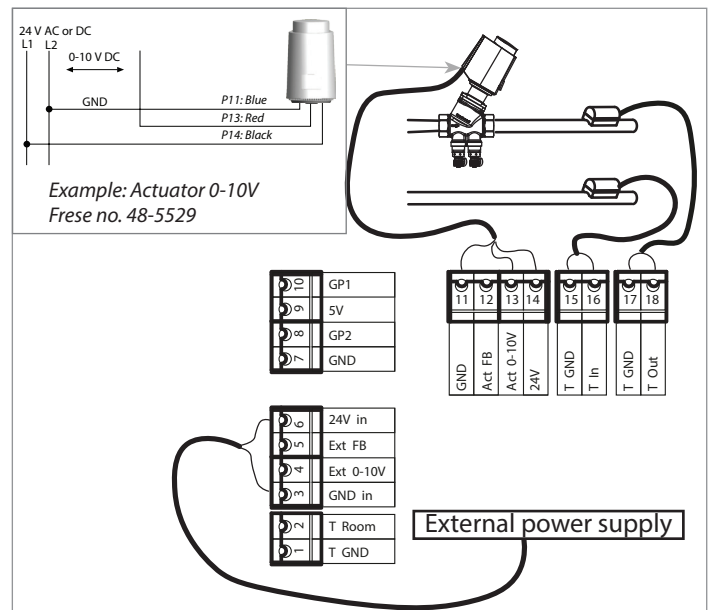
### Using the Frese DELTA T Control System as standalone - without an external control signal

Frese DELTA T Control system can operate as standalone - without an external control signal. In this operation mode it can control the flow based on the measured difference in supply and return temperatures. However, when operating as standalone the Frese DELTA T Control system does not receive any external signal to fully close the valve when no flow is needed. For this reason and also due to the flow starving protection function implemented in the Frese DELTA T Control system, it will not close the flow completely.

To secure the flow starving protection functionality the Frese DELTA T Control system never generates control signal of less than 2V. Consequently the minimum flow that can be achieved, when it operates as standalone, is based on the valve opening at 2V control signal.



Frese DELTA T Control System mounting

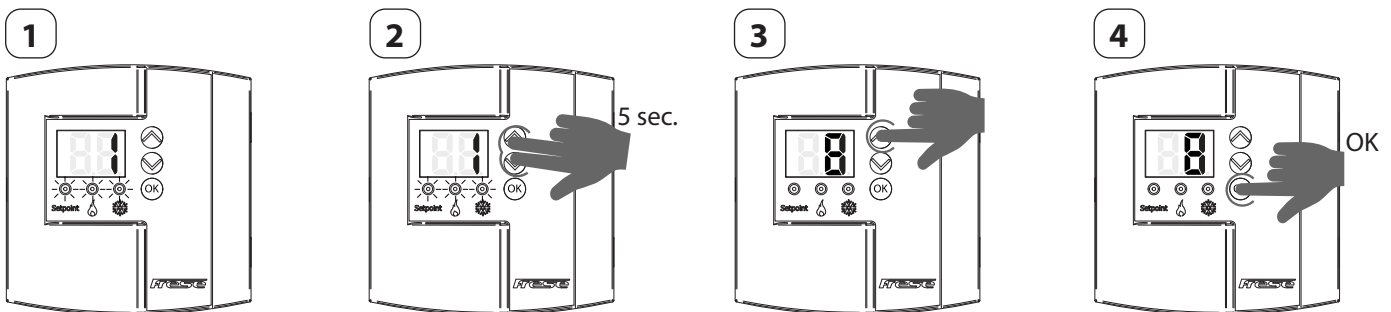


Frese DELTA T Control System electrical wiring

Before the Frese DELTA T Control system can start operating as standalone it must be configured:

1. After connecting the power supply the first 30 seconds **1** or **0** is displayed on the LCD display and all 3 LEDs flash slowly.
2. During these first 30 seconds the two arrow buttons must be pressed simultaneously for at least 5 seconds. The LCD display starts flashing which means the device can be configured.
3. The arrow UP button must be pressed until **8** is displayed on the LCD display.
4. The OK button must be pressed to save the setting. The Frese DELTA T Control system reboots and **8** (9) digits are displayed.

The standalone mode is activated and it remains active also after the power supply is disconnected and restored.

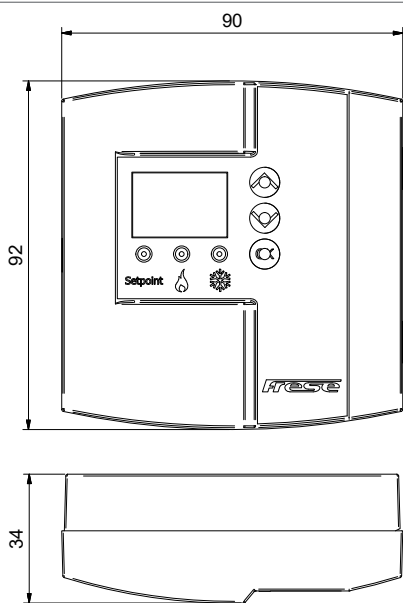


## Frese DELTA T Control System

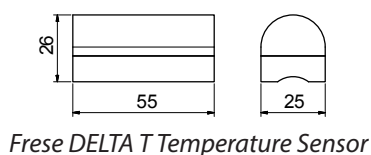
### Technical Data

<b>Control unit material:</b>	ABS and Polycarbonate
<b>Temperature sensor material:</b>	ABS
<b>Protection class:</b>	23 to EN 60529
<b>Supply:</b>	24V AC/DC
<b>Power consumption:</b>	1,5 VA
<b>Maximum power consumption:</b>	4 VA
<b>Control input/output signal:</b>	0 - 10V DC
<b>Feedback signal:</b>	0-10V DC
<b>ΔT setting range:</b>	0.2°C - 40°C
<b>Temperatur sensor range:</b>	0°C - 110°C
<b>Ambient operating conditions:</b>	5°C - 50°C 20 - 90% RH
<b>Weight:</b>	110 g
<b>Cable length - temperature sensor:</b>	2 m

### Dimensions [mm]

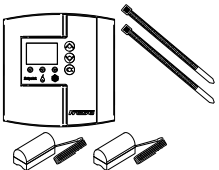
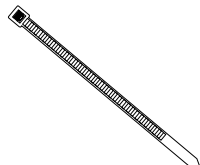


Frese DELTA T Control Unit



Frese DELTA T Temperature Sensor

### Product Programme Frese DELTA T Control System

	Type	Frese no.
	Frese DELTA T Control System including temperature sensors with 2 m cable, and cable ties for pipe dimensions up to DN65	48-5548
	Cable ties 600mm (4 pcs)	07-2823

## Frese DELTA T Control System

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### Technical Specification Text

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- The DELTA T Control System shall be able to control both heating and cooling applications
- The DELTA T Control Unit shall automatically detect if mounted in a heating or a cooling application and indicate this by means of LED lights
- The DELTA T Control Unit shall, by an LED display, show the set point  $\Delta T$  and the actual  $\Delta T$
- Design  $\Delta T$  shall be set with steps of 0.1°C
- The DELTA T Control System shall consist of 1 DELTA T Control Unit and 2 temperature sensors with 2 m cables
- Feedback signal 0-10V
- The temperature sensors shall be mounted on the pipes without intrusion of, or modification to, the pipes

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