ENGINEERING
TOMORROW

Safety for a retirement home **with decentralized domestic hot water heating**

EvoFlat™ flat stations

No

legionella testing

thanks to flat stations for decentralized heat distribution and decentralized domestic hot water heating

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> As part of the new-build project involving the construction of a retirement home on Hamburg's Berner Heerweg, the planners and builders opted for decentralized Danfoss EvoFlat™ flat stations. This is certainly a good decision bearing the elderly residents in mind, as decentralized DHW heating is a proven way of preventing Legionella cases. In addition to the high degree of hygienic safety, flat stations also offer energy efficiency and structural advantages.

In apartment buildings, water in showers is under a general suspicion of causing legionella. Annual building services testing is meant to reduce the risk. Decentralized flat stations eliminate the need to perform such tests.

Danfoss flat stations are easy to handle and install.

Assisted-living complexes, retirement homes and nursing homes can be seen popping up in many places – naturally, this has to do with demographic developments in part: an aging society needs new residential solutions. But it is also happening because investors prefer to invest capital in buildings rather than keeping it in the bank.

Commissioned in 2013 by the housing cooperative "Wohnungsgenossenschaft von 1904 e.G.", the retirement home located on Berner Heerweg in Hamburg has 70 residential units with one and a half to three rooms each, spread across two buildings. All of the apartments have a balcony or terrace which is accessible from the living room without having to cross a threshold. The level-entry showers are fitted with handrails. The retirement home also has a large common room for events as well as two guest apartments, both of which are features typical of these facilities.

In principle, there are two ways of supplying the individual apartments with heating and domestic hot water: the traditional arrangement is to supply the water via a central heating system and with central DHW heating (structural characteristic: pipes run vertically from the basement). The alternative is to use decentralized heat distribution and decentralized DHW heating via a flat station (structural characteristic: pipes run horizontally in the apartment; small footprint thanks to in-wall and shaft installation).

Although the traditional arrangement used to supply an apartment requires five pipes (cold water, HE supply, HE return, DHW, hot water circulation), a flat station manages with only three (cold water, HE supply, HE return).

Hygienic protection against Legionella

In addition to the retirement home's heating and hot water engineering, construction planning office Otto & Partner was put in charge of planning the electrical work, sanitation and ventilation installations, as well as the fire alarm system.

The heat supply relies on a contracting arrangement with the firm Lichtblick: the utility company operates a block heating

system (CHP), which feeds energy into a heating water buffer accumulator.

Hot water is supplied to the decentralized flat stations from this buffer accumulator at 75°C. The stations installed are series Termix VMTD-F-B stations by Danfoss: flat stations for direct heating and a thermostatically controlled instantaneous water heater. This technology is particularly suitable for two-pipe systems in apartments that are supplied by a heating network, e.g. by a CHP or a gas boiler. In addition, bills can be generated individually for each apartment – the system has an integrated water meter and a heat meter.

Why decentralized heating distribution? When the operators of the retirement home came face-to-face with the requirements stipulated by the new Drinking Water Ordinance (main feature: regular testing of hot water for Legionella), the cooperative decided not to install a traditional domestic hot water system. This is because the alternative – decentralized domestic hot water via a flat station (freshwater heating) – circumvents the 3-liter / 400-liter requirements of the new ordinance in a very elegant way.

According to engineer Niels Carlsen, a partner with the engineering firm Otto & Partners, the decision to go with Danfoss technology was taken primarily because of the positive experiences they had with the company in the past: "We know from experience that this is a supplier we can rely on to provide competent technical support, including all the design calculations." Danfoss is so flexible, he said, that they would also be willing to design e.g. a flat station with temperature specifications deviating from the standard. "It's not a problem for Danfoss even if we request an oversized flat station – our experience has shown that other suppliers are frequently unable to honor these types of special requests." By choosing Danfoss, Otto & Partners can be sure to receive rapid, flexible support for all issues related to district heating. "This is a key criterion for us."

Danfoss took charge of performing the calculations for the stations in the retirement home project as well. The following points need to be taken into account to ensure correct dimensioning of decentralized systems:

- Heating requirement per residential unit, i.e. the required heating capacity (HE)
- Required domestic hot water performance (DHW)
- Primary and secondary supply and return temperatures (summer/winter)
- Cold water temperature (drinking water supply)
- Required hot water temperature
- Number of residential units in the building (apartment building)
- Additional heat losses in the system.

The size of the buffer accumulator must correspond to the heating requirement associated with peak flow lasting 20 minutes. The pipework is to be designed accordingly.

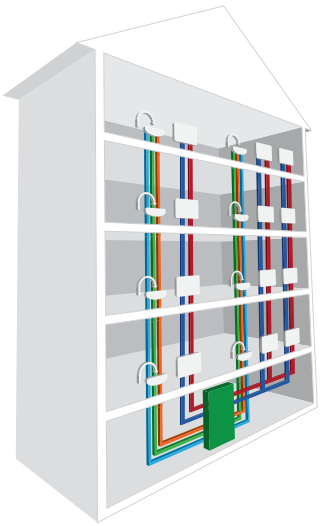
The technology used in the Termix VMTD-F-B

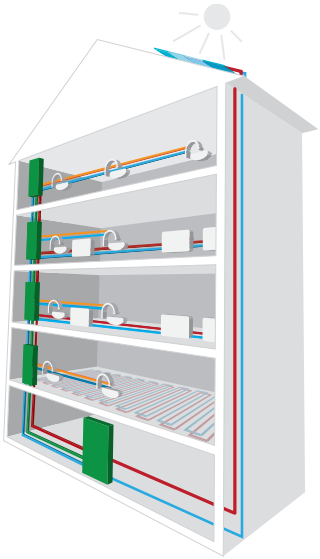
The Termix VMTD-F-B is a direct flat station with an integrated instantaneous water heater and a differential pressure-controlled heating circuit. The station is ideal for apartment buildings with decentralized heat distribution and decentralized DHW heating.

The heating circuit is designed for direct connection. Any changes occurring in the network parameters are compensated for by the differential pressure controller, thereby enabling on-demand, individual temperature control for every room. Where time-dependent temperature control is desired, a zone valve with an actuator and room thermostat can be supplied as an option.

The drinking water is heated in the heat exchanger under thermostatic control. With their special MicroPlate structure, the heat exchangers enable highly uniform distribution of heating media across the plate area. The special design also makes for high strength: there are 80% more solder joints per unit area. These are executed optimally (especially flat solder joints with a clearly defined, large soldering surface), and therefore enable higher operating pressures while improving heat transfer. Compared to a standard herringbone-patterned surface, the MicroPlate structure allows for a more uniform flow velocity – this reduces pressure loss (up to 35%) and improves heat transfer (up to 10%). This allows MicroPlate heat exchangers to save both energy and money – among other things,

The installers at Buhk appreciate the ease of installation and commissioning.





the pumps used to circulate the water require less motive power.

The DHW is heated via the heat exchanger under thermostatic control. The patented sensor actuator accelerates the closing of the thermostatic regulating valve and protects the heat exchanger against overheating and limescale to the greatest possible degree.

The sensor accelerator and the regulating valve also function as a bypass to keep the hot water line warm. This means that domestic hot water is also available immediately in the summer months and during times of reduced heating operation. In addition, the sensor accelerator automatically ensures a stable hot water temperature at times of fluctuating hot-water demand, and with fluctuating supply temperatures and differential pressures as well.

As the thermostatic controller avoids pressure losses on the secondary side of the heat exchanger, this control mode can also be used at low cold water pressure.

The maximum domestic hot water flow rate per minute is limited both by unit power and by the configured hot water temperature.

Termix VMTD-F-B technology at a glance:

- House substation for district heating and decentralized systems
- Direct connection of heating, thermostatic control of DHW temperature
- 33 to 85 kW for DHW
- Operates independently of fluctuating differential pressures and supply temperatures
- Very small footprint
- Hygienically safe DHW heating based on the continuous flow principle
- Limescale largely avoided.

Security of supply thanks to intelligent design

What does a technician who installs and maintains such systems have to say? Operating technician Thorsten Toedt – who works for engineering firm Heinrich Buhk – regularly has positive experiences when he installs Danfoss flat stations. "The handling is completely hassle-free," he says. This is the reason he prefers this supplier to other suppliers on the market: "Our installers understand the technology and appreciate the ease of installation and commissioning." All you have to do is turn the ball valves installed on the bottom, he says, bleed the unit, set the temperature, and you're done. One thing that Buhk appreciates in particular is the support provided by Danfoss when it comes to designing the stations and performing all the necessary calculations.

What Thorsten Toedt likes about the Termix series in particular: the controller for domestic hot water is installed in the heating circuit – this makes the system very robust, and the system is not influenced by parameters in the cold water. "All of which means that security of supply is better with a Termix than when you look at the other systems out there," Toedt is certain.

Practical tip: Reasons to choose decentralized flat stations

- Maximum efficiency thanks to centralized heat generation as compared to individual heaters; optimum boiler operation thanks to longer burner run times
- Easy integration of renewable energy sources with buffer accumulator
- Higher utilization level of solar and condensing systems with low return temperatures
- No line loss due to decentralized hot water heating
- No additional pump energy with decentralized water heating
- A high level of hot water convenience, with freshwater systems in every apartment (substantially eliminating the risk of Legionella growth)
- No meter sections in the kitchen or bathroom with integrated heating and water meters in the station
- Easier hydronic balancing with integrated differential pressure and volume flow limitation in every station
- Consumption-based billing: Energy/ water meter in every station.